SITE ASSESSMENT REPORT
LINCOLN COUNTY OWL'S DEN LANDFILL
LINCOLNTON, NORTH CAROLINA

S&ME Project No. 1356-08-002

Prepared for:
North Carolina Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Prepared by:
S&ME, Inc.
9751 Southern Pine Blvd.
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September 5, 2008

S&ME

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September 5, 2008

North Carolina Department of Environment and Natural Resources
Division of Waste Management – Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Attention: Ms. Jaclynne Drummond, Compliance Hydrogeologist

Reference: **Site Assessment Report**
Lincoln County Owl's Den Landfill
Lincolnton, North Carolina
S&ME Project No. 1356-08-002

Dear Ms. Drummond:

S&ME, Inc. (S&ME), on behalf of Lincoln County, submits this assessment report for the Lincoln County Owl's Den Landfill. This report summarizes the field activities outlined in our February 27, 2008 Site Assessment Plan approved by the North Carolina Department of Environment and Natural Resources – Solid Waste Section (NCDENR-SWS) on March 20, 2008.

If you have questions regarding this Site Assessment Report, please do not hesitate to contact us.

Respectfully submitted,

S&ME, Inc.

Courtney R. Withers

Courtney R. Withers, G.I.T.
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Julie R. Petersen

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NORTH CAROLINA LICENSED SEAL 1995 GEOLOGIST JULIE R. PETERSEN

Senior Reviewed by M. Neal McElveen, P.E., Environmental Services Manager

Cc: Nancy Rickard, Lincoln County Solid Waste Director

CRW/JRP/nc S:\56\08-002\Site Assessment Report.doc

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1. PROJECT BACKGROUND

S&ME began semi-annual surface water sampling at the Lincoln County Owl's Den Landfill in 1997. During subsequent sampling events, two volatile organic compounds (VOCs), cis-1,2-dichloroethene and trichloroethene, were detected at surface water sampling location SW-2. Due to the detection of these volatile organic compounds, the NCDENR requested further site assessment at the Lincoln County Owl's Den Landfill.

In 2000, S&ME performed an initial site assessment, which included installation and semi-annual sampling of four shallow groundwater monitoring wells, MW-1, MW-2, MW-3, and MW-4. A private water supply well survey was also performed, which identified fifteen private water supply wells located within ¼-mile radius of the estimated edge of waste. After initial sampling, four of the private supply wells located closest to the edge of waste were selected for continued annual sampling (PSW-1, PSW-3, PSW-6, and PSW-16).

Subsequent semi-annual sampling of the on-site monitoring wells indicated that there were VOC concentrations in monitoring wells MW-2, MW-3, and MW-4, which exceeded the NCAC 2L groundwater quality standards. Due to the NCAC 2L exceedances in monitoring wells MW-2, MW-3, and MW-4, NCDENR requested further site assessment.

S&ME performed additional site assessment activities in 2001, which included the installation of 5 additional groundwater monitoring wells, MW-5, MW-6, MW-6A, MW-7, and MW-7A, as well as, four methane monitoring wells, MMW-1, MMW-2, MMW-3, and MMW-4, which were incorporated into the semi-annual sampling at the site. Nested pairs MW-6/6A and MW-7/7A were installed as close as practical to the surface water features on-site to evaluate hydraulic gradients. During subsequent sampling events, VOC concentrations exceeding the NCAC 2L groundwater quality standards were detected in the following monitoring wells; MW-2, MW-3, MW-4, MW-6, MW-6A, and MW-7. Also, methane concentrations measured in MMW-1, MMW-2, MMW-3, and MMW-4 exceeded the Lower Explosive Limit (LEL) one or more times.

In 2004, the NCDENR requested additional assessment at the Owl's Den Landfill due to VOCs exceeding groundwater quality standards and methane levels exceeding the LEL near the property boundary. To address this issue, the NCDENR suggested remediation and/or acquisition of additional buffer. Lincoln County has since purchased two adjacent parcels to the southeast of the landfill in the vicinity of MW-3 and MMW-3, as well as, property to the north of the Owl's Den Landfill site. The parcels to the southeast of the site were purchased to provide additional buffer between the edge of waste and private properties in the vicinity of MW-3 and MMW-3. The property to the north of the landfill was purchased to provide Lincoln County ownership of property at the apparent discharge point of groundwater from the site.

With the additional property purchase, the NCDENR has requested that further assessment of up gradient groundwater and methane be performed to evaluate the extent

of migration on-site and a demonstration that Lincoln County owns property to the groundwater discharge down gradient of the landfill, to evaluate if corrective actions are required.

To address the concerns of the NCDENR, S&ME submitted a Site Assessment Plan on February 27, 2008 which discussed the groundwater flow regime down gradient of the landfill and outlined further assessment activities up gradient at the site. The assessment plan was approved by the NCDENR on March 20, 2008.

The following report summarizes the field activities and findings from our July 2008 site assessment activities at the Lincoln County Owl's Den Landfill.

2. FIELD ACTIVITIES

S&ME performed field activities as described in the Lincoln County Owl's Den Landfill Site Assessment Plan dated February 27, 2008. Site assessment field activities at the Owl's Den Landfill began on July 7, 2008.

2.1 Well Installation

To further evaluate on-site groundwater contaminant and methane migration, S&ME installed three additional shallow groundwater monitoring wells (MW-8, MW-9, and MW-10), as well as, five additional methane monitoring wells (MMW-5 through MMW-9) at the Lincoln County Owl's Den Landfill. The locations of the wells were surveyed by Origin Land Surveying and Mapping™ and are indicated on the attached Site Map, Figure 1. Groundwater and methane monitoring wells were installed by a North Carolina certified well driller in accordance with the 15A NCAC 2C standards. Boring logs, well logs, and well construction records for the three groundwater monitoring wells and five methane monitoring wells are included in Appendix I.

2.1.1 Groundwater Monitoring Wells

Three groundwater monitoring wells (MW-8, MW-9, and MW-10) were installed utilizing an ATV drill rig with 4.25-inch hollow-stem augers. The groundwater wells were constructed of 2-inch diameter Schedule 40 PVC casing with 15-feet of 0.010-inch machine slotted PVC screen. The sand pack consists of #2 silica sand extending from the base of the screen to approximately 2-feet above the screen. An approximate 2-foot bentonite seal was placed on top of the sand pack then completed to ground surface with a neat cement grout. Well screen elevations were determined in the field by the on-site Geologist so that the well screens bracket the groundwater table.

To complete the groundwater wells, an above grade 4-inch by 4-inch steel protective cover with a lockable cap was sealed in the center of a 2-foot by 2-foot concrete pad. The protective cover was identified with a permanently affixed well I.D. tag in accordance with North Carolina well regulations.

After construction was complete, the monitoring wells were surveyed to obtain ground surface and top of casing elevations. Well construction records were submitted to the NCDENR – Division of Water Quality (DWQ) after well completion.

2.1.2 Methane Monitoring Wells

Five methane monitoring wells were installed utilizing an ATV drill rig with 4.25-inch hollow-stem augers. The methane wells were installed to depths above the groundwater table and constructed of 1-inch Schedule 40 PVC screen and casing. Methane wells were screened with 0.010-inch slotted screen of variable length. The annulus of the boring surrounding the screen was backfilled with #2 silica sand to within approximately 3 to 5 feet of the land surface. An approximate 1-foot bentonite seal was placed on top of the sand pack then completed to ground surface with a neat cement grout. The top of the casing extending from the ground surface was finished with a quick connect fitting cap that will allow for methane measurements from the well without removing the cap.

To complete the methane wells, an above grade 4-inch by 4-inch steel protective cover with a lockable cap was sealed in the center of a 2-foot by 2-foot concrete pad. The protective cover was identified with a permanently affixed well I.D. tag in accordance with North Carolina well regulations.

2.2 Development and Slug Testing

After installation, groundwater monitoring wells were developed to remove clay, silt, and sand particles that may have been introduced into the formation or filter pack during installation. Development was conducted as soon as practical after installation, but no sooner than 24 hours after completion.

In order to evaluate the hydrogeological characteristics of the subsurface materials, S&ME performed in-situ permeability tests (slug tests) in the groundwater monitoring wells. Slug tests were conducted as soon as practical after the wells were developed, but no sooner than 24 hours after development to allow water levels to stabilize.

Slug tests were performed in the field utilizing the rising-head method, in which water was pumped from the well and recharge was recorded with time. Data collected from slug testing was analyzed using the Bouwer and Rice graphical method to calculate horizontal permeability. Based on the slug testing performed on-site, hydraulic conductivity values estimated in the newly installed groundwater monitoring wells range from 9.04×10^{-04} to 1.27×10^{-03} centimeters per second (cm/sec). Permeability calculation sheets are included in Appendix II.

2.3 Sampling

The initial sampling event for the new groundwater monitoring wells was performed after development and slug testing. Subsequent groundwater sampling will be on a semi-annual basis occurring in the months of April and October during semi-annual sampling of the existing monitoring wells and surface water locations.

2.3.1 Groundwater Monitoring Wells

The initial sampling event for the three new groundwater monitoring wells was conducted on July 21 through July 22, 2008. Groundwater monitoring wells were purged by removing a minimum of three well volumes approximately 24-hours prior to sample collection. Samples were collected using disposable Teflon bailers and placed in laboratory provided sample bottles. Sample bottles were packaged on ice and sent to Environmental Conservation Laboratories, Inc. (ENCO) in Cary, North Carolina for analysis.

Groundwater samples were analyzed for total RCRA metals and EPA Method 8260 volatile organic compounds. Groundwater quality monitoring data was compared to the the 15A NCAC 2L standards and the SWS GWP standards. Results of the July 2008 sampling event are discussed in Section 5.1 and summarized in Table 4. Well sampling records and laboratory analytical data sheets are included in Appendix III.

2.3.2 Methane Monitoring Wells

During the initial sampling event for the new groundwater monitoring wells, methane readings from the five new methane monitoring wells, as well as, the four existing methane monitoring wells were recorded utilizing a GEM 500 Gas Meter. Methane readings are summarized in Table 5. The five new methane monitoring wells will be subsequently monitored on a semi-annual basis along with the existing methane monitoring wells, with concentrations reported in the semi-annual monitoring reports for the site.

3. SOIL LABORATORY TESTING

S&ME performed laboratory grain size distributions with hydrometers and specific gravity tests on selected split-spoon soil samples recovered from the saturated portion of the screened interval from each newly installed groundwater monitoring well. S&ME utilized the results of the laboratory grain size testing to estimate porosity of the formation adjacent to the screened intervals of the groundwater monitoring wells.

Total and effective porosity estimated from grain size were based on the soil classifications and the "Variance of Porosity, Specific Yield, and Specific Retention with Grain Size" table (Bear, J., 1972) in conjunction with the "Textured Classification Triangle" for unconsolidated materials showing relationship between particle size and specific yield (Fetter, C.W., 1994). Soil laboratory testing data sheets and porosity calculations sheets are included in Appendix IV.

4. GROUNDWATER LEVELS AND FLOW DATA

Groundwater levels for the three newly installed groundwater monitoring wells, as well as, the nine existing groundwater monitoring wells were recorded during the July 2008 assessment activities. Groundwater elevations for the groundwater monitoring wells are included in Table 2. Water table elevations and our interpretation of the groundwater surface expressed as potentiometric contours are depicted on the attached Figure 1.

Based on the on-site water levels, groundwater at the site flows from south to north toward the drainage features (i.e. tributaries) bordering or adjacent to the site to the west, south, and east of the property. The aforementioned tributaries discharge into Howard's Creek located approximately 1375 feet north of the property (Figure 2).

The hydraulic gradient (*i*) in the vicinity of each well was determined by calculating the vertical difference between the groundwater elevation at each well and one or more nearby equipotential lines from the Site Map (Figure 1). The value was then divided by the distance measured between two endpoints of a projected flow path through the well that intersects the up gradient and/or down gradient equipotentials. Groundwater velocity was calculated by multiplying the gradient (*i*) by the hydraulic conductivity (*k*) and dividing by the estimated effective porosity (n_e) of the aquifer. Based on the July 2008 groundwater levels, groundwater velocity in the vicinity of the landfill ranges from 35 to 471 feet per year. Table 3 summarizes the groundwater flow velocity on-site.

5. ANALYTICAL DATA

5.1 Groundwater Monitoring Wells

The three newly installed groundwater monitoring wells were sampled on July 22, 2008. Groundwater samples were analyzed for EPA Method 8260 volatile organic compounds (VOCs) and RCRA metals. Table 4 summarizes the water quality results of the July 22, 2008 sampling event.

5.1.1 Volatile Organic Compounds

Four volatile organic compounds were detected in the three new groundwater monitoring wells; acetone, chloroform, 2-chlorotoluene, and total xylenes. Of the four VOCs detected, none were above their respective NCAC 2L standard.

EPA Volatile Organic Compounds Method 8260B (ug/L)	NCDENR SWSL	15A NCAC 2L	Soild Waste GWP ST	MW-8	MW-9	MW-10
Acetone	100	700	NE		2.1 J	
Chloroform	5	70	NE		4.1	2.5
2-Chlorotoluene	NE	NE	NE	2.6		
Xylenes (total)	5	530	NE	1.9	0.88 J	

5.1.2 Metals

Barium was detected in all three new groundwater monitoring wells at concentrations ranging from 193 to 380 µg/L. Barium is known to be naturally occurring in the area, and the concentrations of barium detected were below the NCAC 2L standard of 2000 µg/L.

EPA RCRA Metals Method 6010B (ug/L)	NCDENR SWSL	15A NCAC 2L	Soild Waste GWP ST	MW-8	MW-9	MW-10
Barium	100	2000	NE	333	380	193

5.2 Methane Monitoring Wells

Methane readings were taken from the five newly installed methane monitoring wells, as well as, the four existing methane monitoring wells during the July 22, 2008 sampling event. Table 5 summarizes the methane readings recorded. Please note that no methane was detected above the Lower Explosive Limit (LEL) during the July 22, 2008 event.

6. CONCLUSIONS AND RECOMMENDATIONS

Based on the July 2008 site assessment activities at the Lincoln County Owl's Den Landfill, S&ME concludes that a sufficient monitoring well network is now in place to effectively monitor the extent of groundwater and methane migration on-site. Although four VOCs and one metal were detected in the three new groundwater monitoring wells, they were low level detections below the NCAC 2L standards. Methane was not detected above the LEL in the five newly installed methane monitoring wells, nor in the four existing methane monitoring wells.

Based on the findings from the July 2008 site assessment, S&ME proposes removing groundwater monitoring well, MW-3, and methane monitoring wells, MMW-1 and MMW-3, from the facility's Water Quality Monitoring Plan due to their close proximity to the edge of waste, now that monitoring wells are in place that monitor the property boundary up gradient from these well locations. The methane monitoring wells will be abandoned in-place, while groundwater monitoring well MW-3 will remain unabandoned for water level monitoring purposes only.

Upon approval of this assessment report by the NCDENR - Solid Waste Section, S&ME will proceed with well abandonment (if approved) and update the facility's Water Quality Monitoring Plan to incorporate the newly installed monitoring wells and remove any approved monitoring wells.

TABLES

TABLE 1
MONITORING WELL CONSTRUCTION SUMMARY
Lincoln County - Owl's Den Landfill
S&ME Project No: 1356-08-002

WELL ID	N.C. COORDINATES		SURVEY ELEVATIONS		Water *	SURFACE COVER	PAD TYPE	PROTECTIVE CASING	CASING TYPE	CASING INTERVAL (ft-bls)		SCREEN TYPE	SCREEN INTERVAL (ft-bls)		GROUT TYPE	GROUT INTERVAL (ft-bls)		SEAL TYPE	SEAL INTERVAL (ft-bls)		FILTER PACK TYPE	FILTER PACK INTERVAL (ft-bls)	
	NORTH	EAST	GROUND	TOC	(ft-bls)																		
MMW-5	639229.17	1312503.46	877.57	880.47	N/A	Above Grade	2'x2' Concrete	4"x4" Steel	1" Sch. 40 PVC	2.90	6.00	0.010 Slotted Sch. 40 PVC	6.00	36.00	Neat Cement	0.00	3.00	Bentonite	3.00	4.70	#2 Silica Sand	4.70	36.00
MMW-6	639105.41	1312886.55	881.74	884.90	N/A	Above Grade	2'x2' Concrete	4"x4" Steel	1" Sch. 40 PVC	3.16	5.00	0.010 Slotted Sch. 40 PVC	5.00	40.00	Neat Cement	0.00	1.50	Bentonite	1.50	3.00	#2 Silica Sand	3.00	40.00
MMW-7	639285.44	1313132.08	863.09	866.26	N/A	Above Grade	2'x2' Concrete	4"x4" Steel	1" Sch. 40 PVC	3.17	5.00	0.010 Slotted Sch. 40 PVC	5.00	25.00	Neat Cement	0.00	2.00	Bentonite	2.00	3.00	#2 Silica Sand	3.00	25.00
MMW-8	639532.66	1313188.92	864.20	867.15	N/A	Above Grade	2'x2' Concrete	4"x4" Steel	1" Sch. 40 PVC	2.95	5.00	0.010 Slotted Sch. 40 PVC	5.00	30.00	Neat Cement	0.00	3.00	Bentonite	3.00	4.00	#2 Silica Sand	4.00	30.00
MMW-9	639600.49	1312999.46	855.61	858.68	N/A	Above Grade	2'x2' Concrete	4"x4" Steel	1" Sch. 40 PVC	3.07	5.00	0.010 Slotted Sch. 40 PVC	5.00	20.00	Neat Cement	0.00	3.00	Bentonite	3.00	4.00	#2 Silica Sand	4.00	20.00
MW-8	639234.22	1312504.31	878.23	881.21	46.80	Above Grade	2'x2' Concrete	4"x4" Steel	2" Sch. 40 PVC	2.98	39.00	0.010 Slotted Sch. 40 PVC	39.00	54.00	Neat Cement	0.00	34.50	Bentonite	34.50	36.50	#2 Silica Sand	36.50	54.00
MW-9	639106.68	1312880.38	882.19	884.94	49.30	Above Grade	2'x2' Concrete	4"x4" Steel	2" Sch. 40 PVC	2.75	45.00	0.010 Slotted Sch. 40 PVC	45.00	60.00	Neat Cement	0.00	36.00	Bentonite	36.00	39.50	#2 Silica Sand	39.50	60.00
MW-10	639528.27	1313193.32	864.33	867.11	42.60	Above Grade	2'x2' Concrete	4"x4" Steel	2" Sch. 40 PVC	2.78	33.00	0.010 Slotted Sch. 40 PVC	33.00	48.00	Neat Cement	0.00	29.00	Bentonite	29.00	31.30	#2 Silica Sand	31.30	48.00

Notes:

TOC = Top of PVC casing

ft = Feet

ft-bls = Feet below land surface

N/A = Not Applicable

* Water levels recorded during July 2008 slug testing

= Methane Monitoring Wells

= Groundwater Monitoring Wells

TABLE 2
GROUNDWATER LEVEL SUMMARY
Lincoln County - Owl's Den Landfill
S&ME Project No. 1356-08-002

Well ID	Ground Surface Elevation (ft-msl)	Well Depth (ft-bls)	Date	Depth to Groundwater (ft-bls)	Water Level Elevation (ft-msl)	Water Column (ft)
MW-1	863.2	45	7/22/2008	35.45	827.75	9.55
MW-2	822.50	38	7/22/2008	23.34	799.16	14.66
MW-3	870.20	48	7/22/2008	40.57	829.63	7.43
MW-4	831.80	55	7/22/2008	38.58	793.22	16.42
MW-5	835.90	30	7/22/2008	24.78	811.12	5.22
MW-6	805.44	21	7/22/2008	14.32	791.12	6.68
MW-6A	805.17	55	7/22/2008	15.49	789.68	39.51
MW-7	815.47	25	7/22/2008	20.32	795.15	4.68
MW-7A	814.68	51.5	7/22/2008	19.14	795.54	32.36
MW-8	878.23	54	7/21/2008	47.19	831.04	6.81
MW-9	882.19	60	7/21/2008	48.02	834.17	11.98
MW-10	864.33	48	7/21/2008	42.59	821.74	5.41

Notes:

MW-1 through MW-7A: Ground surface elevations and well depths obtained from Assessment Report dated November 29, 2001

MW-8 through MW-10: New groundwater monitoring wells installed and surveyed during July 2008 Assessment activities

ft-bls = Feet below land surface

ft-msl = Feet relative to mean sea level

Table 3 - Groundwater Flow Velocity
Lincoln County - Owl's Den Landfill
S&ME Project No. 1356-08-002

Well Identification	Hydraulic Conductivity (K) ft/yr	Effective Porosity (n_e)	Hydraulic Gradient (i) ft/ft	Seepage Velocity (v) ft/yr
MW-1	4.31E+02	0.2	0.02	43
MW-2	2.64E+03	0.28	0.05	471
MW-3	9.82E+02	0.33	0.02	60
MW-4	1.33E+03	0.3	0.05	222
MW-5	6.20E+02	0.27	0.03	69
MW-6	4.20E+02	0.29	0.03	43
MW-7	2.10E+02	0.3	0.05	35
MW-8	5.57E+02	0.28	0.03	60
MW-9	1.33E+03	0.31	0.02	86
MW-10	9.50E+02	0.31	0.02	61

Notes:

(1) Hydraulic Conductivity and Effective Porosity for wells MW-1 through MW-7 were obtained from Assessment Report dated November 29, 2001

(2) Hydraulic Conductivity for wells MW-8 through MW-10 was calculated from slug tests performed after well construction during July 2008 Assessment Activities.

(3) Effective Porosity for wells MW-8 through MW-10 was estimated from soils collected within the saturated portion of screen interval during July 2008 Assessment activities; Assumed to be approximately equal to specific yield

(4) Hydraulic gradient calculated by measuring linear feet between selected contour intervals.

(5) Seepage velocity $v = (K*i)/n_e$

Table 4 - Water Quality Summary
Lincoln County - Owl's Den Landfill
S&ME Project No. 1356-08-002

EPA Volatile Organic Compounds Method 8260B (ug/L)	NCDENR SWSL	15A NCAC 2L	Soild Waste GWP ST	MW-8	MW-9	MW-10
Acetone	100	700	NE		2.1 J	
Chloroform	5	70	NE		4.1	2.5
2-Chlorotoluene	NE	NE	NE	2.6		
Xylenes (total)	5	530	NE	1.9	0.88 J	
EPA RCRA Metals Method 6010B (ug/L)	**NCDENR SWSL**	**15A NCAC 2L**	**Soild Waste GWP ST**	**MW-8**	**MW-9**	**MW-10**
Barium	100	2000	NE	333	380	193

Notes:

(1) ug/L = micrograms per liter (parts per billion)

(2) 15A NCAC 2L = North Carolina Groundwater Quality Standards

(3) GWP ST = Solid Waste Groundwater Protection Standard

(4) NE = No established standard

(5) Bold and highlighted indicates above 15A NCAC 2L or GWP ST

(6) Compounds not shown were not detected.

(7) Target analytes not shown were reported as below detection limits

(8) SWSL = North Carolina Department of Environmtent and Natural Resources Solid Waste Section Limit established in 2007

Table 5 - Methane Monitoring Well Readings
Lincoln County - Owl's Den Landfill
S&ME Project No. 1356-08-002

Location	% LEL	% Gas	Date and Time of Reading
MMW-1	14.4	7.2	7/22/2008 0855
MMW-2	42	21	7/22/2008 0915
MMW-3	73	36.5	7/22/2008 0850
MMW-4	0.2	0.1	7/22/2008 1000
MMW-5	10.6	5.3	7/22/2008 1035
MMW-6	0	0	7/22/2008 1040
MMW-7	0	0	7/22/2008 0855
MMW-8	0	0	7/22/2008 0835
MMW-9	0	0	7/22/2008 0840

Notes:

LEL = Lower Explosive Limit

FIGURES

REFERENCE:

PARCEL AND TOPOGRAPHIC GIS DATA AND AERIAL PHOTOGRAPHY WERE OBTAINED FROM THE LINCOLN COUNTY GEOGRAPHIC INFORMATION SYSTEMS (GIS) DEPARTMENT. EXISTING AND PROPOSED WELL LOCATIONS, SURFACE WATER SAMPLE LOCATIONS, GROUND WATER SURFACE DATA, AND SURFACE WATER FEATURES WERE GENERATED BY S&ME, INC. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.

S&ME
WWW.SMEINC.COM

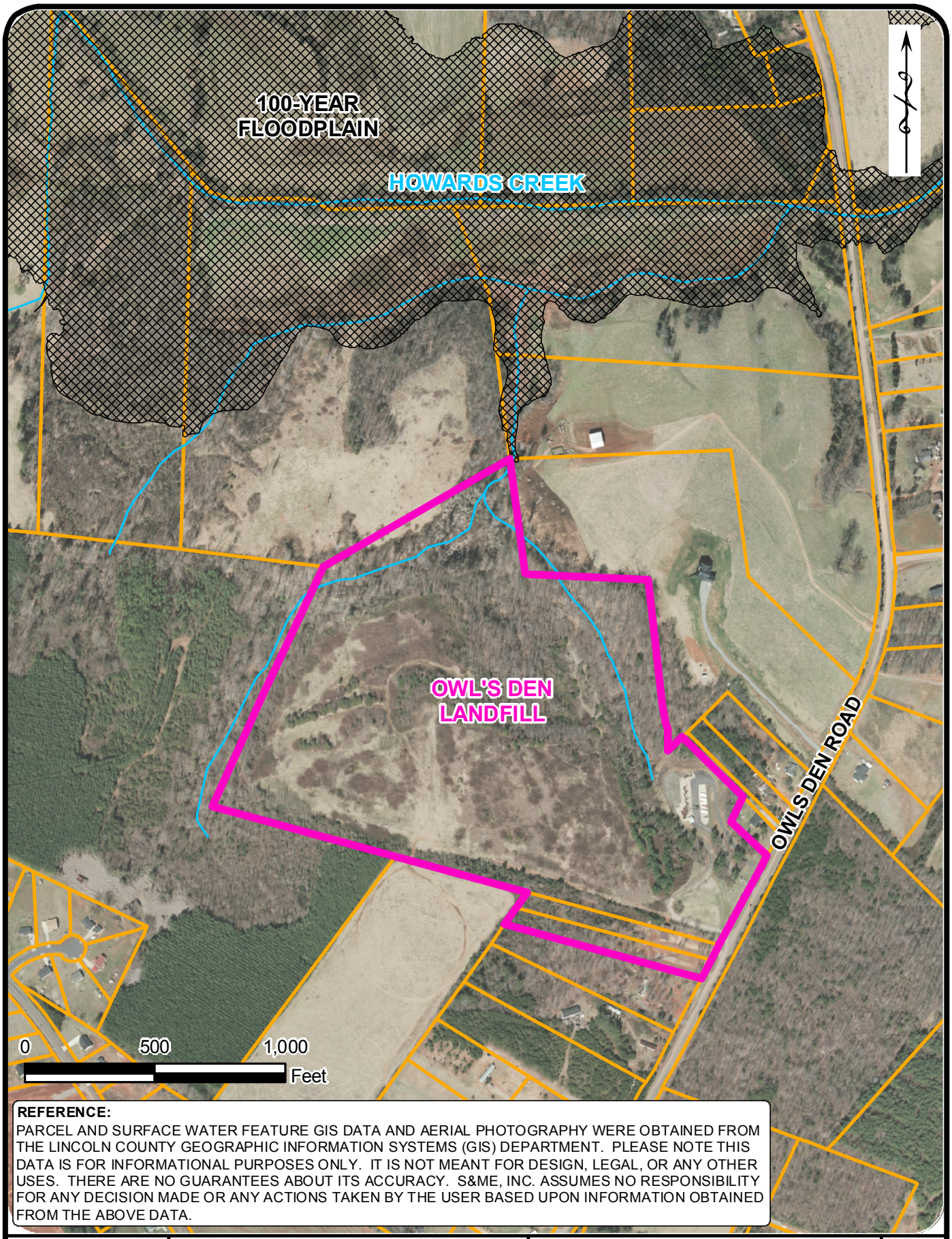
NO.	DATE	DESCRIPTION	BY

JULY 2008 SITE ASSESSMENT SITE MAP

OWLS DEN LANDFILL LINCOLNTON, NORTH CAROLINA

DRAWN BY: CXR	CHECKED BY: CRW
DESIGNED BY:	APPROVED BY: JRP
PROJECT NO: 1356-08-002	
SCALE: 1" = 100'	DATE: 08/18/08
DRAWING: 1	OF: 1

DRAWING PATH: Q:\1356\Lincoln County\Owls Den Assessment Activities (1356-08-002)\03-July 2008 Assessment.mxd



REFERENCE:
PARCEL AND SURFACE WATER FEATURE GIS DATA AND AERIAL PHOTOGRAPHY WERE OBTAINED FROM THE LINCOLN COUNTY GEOGRAPHIC INFORMATION SYSTEMS (GIS) DEPARTMENT. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.

SCALE:	1" = 500'
DATE:	08-28-08
DRAWN BY:	CXR
PROJECT NO:	1356-08-002

S&ME
WWW.SMEINC.COM

2005 AERIAL PHOTO & 100-YEAR FLOODPLAIN

OWL'S DEN LANDFILL
LINCOLN COUNTY, NORTH CAROLINA

FIGURE NO.
2

APPENDIX I

WELL CONSTRUCTION RECORDS, BORING LOGS, AND WELL LOGS

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MMW-5

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☒ (list use) methane monitoring

DATE DRILLED 7/14/08

TIME COMPLETED 5:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 03.9

LONGITUDE 81 18 34.7

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 36 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: N/A FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2.9 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

From	To	Ft.	Diameter	Thickness/ Weight	Material
0	6		1"	Sch. 40	PVC

7. GROUT:

From	To	Ft.	Material	Method
0	3		Neat Cement	pour
3	4.7		Bentonite	pour

8. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
6	36		1 in.	0.010 in.	PVC
			in.	in.	
			in.	in.	

9. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
4.7	36		#2	Silica Sand

10. DRILLING LOG

From To	Formation Description
0 to 9	Clayey Silt
9 to 29.5	Silty Sand
29.5 to 33	Clayey Silt
33 to 36	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. LITTLE
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, North Carolina
Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MMW-5**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 1
Boring Depth (ft): **36.0**	Elevation (ft): **877.6**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/14/08**
Logged By: **Courtney Withers**	Water Level: **N/A**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
875			RESIDUUM: Red, Micaceous, Clayey, **SILT** With Quartz Rock Fragments		
	5				
870					
	10		SAPROLITE: Reddish-Brown, Very Micaceous, Silty, Fine **SAND**		
865					
	15				
860					
	20		SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		
855					
	25				
850					
			SAPROLITE: White and Tan, Medium to Fine **SAND**		
	30		SAPROLITE: Orange, Micaceous, Slightly Clayey, **SILT** With Manganese Staining		
845					
	35		SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining and White, Medium to Fine **SAND** Lenses		
			Boring Terminated at 36.0 ft bls		

COMPLETION REPORT OF WELL No. MMW-5

PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **N/A**

LATITUDE: **35 29 03.9**
LONGITUDE: **81 18 34.7**
TOP OF CASING ELEVATION: **880.47**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/14/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00		877.57
RESIDUUM: Red, Micaceous, Clayey, **SILT** With Quartz Rock Fragments		0		3.00		874.57
				4.70		872.87
		5				
SAPROLITE: Reddish-Brown, Very Micaceous, Silty, Fine **SAND**		10				
		15				
SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		20				
		25				
SAPROLITE: White and Tan, Medium to Fine **SAND**		30				
SAPROLITE: Orange, Micaceous, Slightly Clayey, **SILT** With Manganese Staining		35		36.00		841.57
SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining and White, Medium to Fine **SAND** Lenses						

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **1"**
Type: **PVC**
Interval: **0 to 6 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 3 ft bls**

SEAL
Type: **Bentonite**
Interval: **3 to 4.7 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **4.7 to 36 ft bls**

SCREEN
Diameter: **1"**
Type: **0.010 Slotted PVC**
Interval: **6 to 36 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MMW-5

Sheet 1 of 1

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MMW-6

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☒ (list use) methane monitoring

DATE DRILLED 7/9/08

TIME COMPLETED 9:00 AM ☒ PM ☐

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 02.8

LONGITUDE 81 18 30.1

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- Is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 40 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: N/A FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.2 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

From	To	Ft.	Diameter	Thickness/ Weight	Material
0	5		1"	Sch. 40	PVC

7. GROUT:

From	To	Ft.	Material	Method
0	1.5		Neat Cement	pour
1.5	3		Bentonite	pour

8. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
5	40		1 in.	0.010 in.	PVC
			in.	in.	
			in.	in.	

9. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
3	40		#2	Silica Sand

10. DRILLING LOG

From	To	Formation Description
0	6	Sandy Silt
6	33	Silty Sand
33	40	Sandy Silt

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. Little
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

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Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MMW-6**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 1
Boring Depth (ft): **40.0**	Elevation (ft): **881.7**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/9/08**
Logged By: **Courtney Withers**	Water Level: **N/A**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
880			RESIDUUM: Red, Micaceous, Slightly Clayey, Fine Sandy, **SILT**		
	5				
875			SAPROLITE: Tan and Reddish-Brown, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		
	10				
870					
	15				
865					
	20				
860					
	25				
855					
	30				
850					
	35		SAPROLITE: Tan and White, Micaceous, Fine Sandy, **SILT** With Manganese Staining and Medium to Coarse **SAND** Lenses		
845					
	40				
			Boring Terminated at 40.0 ft bls		

COMPLETION REPORT OF WELL No. MMW-6

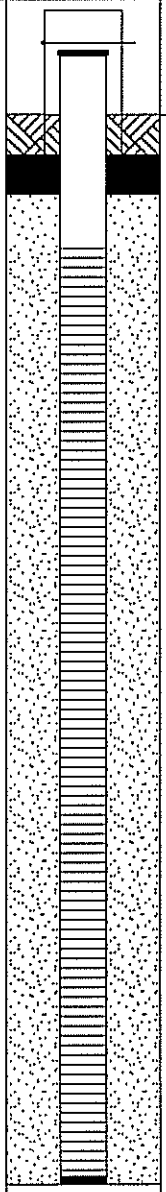
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **N/A**

LATITUDE: **35 29 02.8**
LONGITUDE: **81 18 30.1**
TOP OF CASING ELEVATION: **884.90**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/9/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
		0		0.00		881.74
RESIDUUM: Red, Micaceous, Slightly Clayey, Fine Sandy, **SILT**				1.50		880.24
				3.00		878.74
		5				
SAPROLITE: Tan and Reddish-Brown, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		10				
		15				
		20				
		25				
		30				
SAPROLITE: Tan and White, Micaceous, Fine Sandy, **SILT** With Manganese Staining and Medium to Coarse **SAND** Lenses		35				
		40		40.00		841.74



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **1"**
Type: **PVC**
Interval: **0 to 5 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 1.5 ft bls**

SEAL
Type: **Bentonite**
Interval: **1.5 to 3 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **3 to 40 ft bls**

SCREEN
Diameter: **1"**
Type: **0.010 Slotted PVC**
Interval: **5 to 40 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MMW-6

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MMW-7

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☒ (list use) methane monitoring

DATE DRILLED 7/9/08

TIME COMPLETED 11:30 AM ☒ PM ☐

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 04.6

LONGITUDE 81 18 27.1

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 25 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: N/A FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.2 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

From	To	Ft.	Diameter	Thickness/ Weight	Material
0	5		1"	Sch. 40	PVC

7. GROUT:

From	To	Ft.	Material	Method
0	2		Neat Cement	pour
2	3		Bentonite	pour

8. SCREEN:

From	To	Ft.	Diameter in.	Slot Size in.	Material
5	25		1	0.010	PVC

9. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
3	25		#2	Silica Sand

10. DRILLING LOG

From To	Formation Description
0 to 7.5	Silty Clay
7.5 to 25	Sandy Silt

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Jay A. Little
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

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Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MMW-7**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 1
Boring Depth (ft): **25.0**	Elevation (ft): **863.1**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/9/08**
Logged By: **Courtney Withers**	Water Level: **N/A**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
860	5		RESIDUUM: Brownish-Red, Fine Sandy, Silty, **CLAY**		
855	10		SAPROLITE: Light Brownish-Red, Micaceous, Fine Sandy, **SILT**		
850	15		SAPROLITE: Tannish-Brown, Micaceous, Fine Sandy, **SILT** With Manganese Staining		
845	20				
840	25				

Boring Terminated at 25.0 ft bls
Lithologic Descriptions Obtained From MW-1 (Water Quality Monitoring Plan Upgrade Initial Report dated December 6, 2000)

COMPLETION REPORT OF WELL No. MMW-7

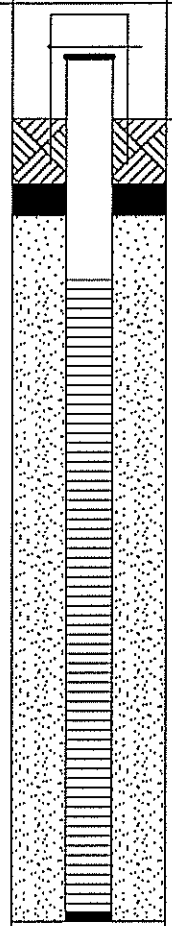
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **N/A**

LATITUDE: **35 29 04.6**
LONGITUDE: **81 18 27.1**
TOP OF CASING ELEVATION: **866.26**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/9/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00		863.09
RESIDUUM: Brownish-Red, Fine Sandy, Silty, CLAY		0		2.00		861.09
				3.00		860.09
		5				
SAPROLITE: Light Brownish-Red, Micaceous, Fine Sandy, SILT		10				
SAPROLITE: Tannish-Brown, Micaceous, Fine Sandy, SILT With Manganese Staining		15				
		20				
		25		25.00		838.09



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **1"**
Type: **PVC**
Interval: **0 to 5 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 2 ft bls**

SEAL
Type: **Bentonite**
Interval: **2 to 3 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **3 to 25 ft bls**

SCREEN
Diameter: **1"**
Type: **0.010 Slotted PVC**
Interval: **5 to 25 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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9751 Southern Pine Blvd.
Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MMW-7

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MMW-8

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☒ (list use) methane monitoring

DATE DRILLED 7/10/08

TIME COMPLETED 3:15 AM ☐ PM ☒

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 07.1

LONGITUDE 81 18 26.5

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 30 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: N/A FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0	To 5	Ft.	1"	Sch. 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0	To 3	Ft.	Neat Cement	pour
From 3	To 4	Ft.	Bentonite	pour
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 5	To 30	Ft.	1 in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 4	To 30	Ft.	#2	Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From To	Formation Description
0 to 30	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. LITTLE
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, North Carolina
Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MMW-8**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 1
Boring Depth (ft): **30.0**	Elevation (ft): **864.2**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/10/08**
Logged By: **Courtney Withers**	Water Level: **N/A**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
860	5		RESIDUUM: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		
855	10		SAPROLITE: Brown, Orange, White, and Black, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		
850	15				
845	20				
840	25				
835	30		**Boring Terminated at 30.0 ft bls**		

COMPLETION REPORT OF WELL No. MMW-8

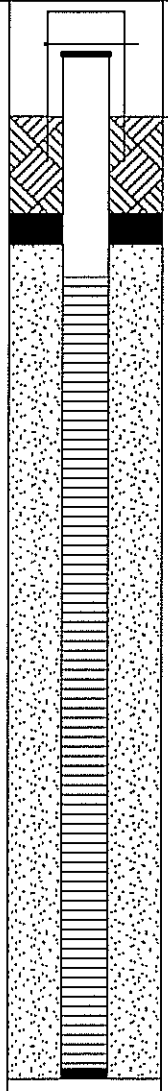
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **N/A**

LATITUDE: **35 29 07.1**
LONGITUDE: **81 18 26.5**
TOP OF CASING ELEVATION: **867.15**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/10/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
		0		0.00		864.20
RESIDUUM: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		5		3.00 4.00		861.20 860.20
SAPROLITE: Brown, Orange, White, and Black, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		10 15 20 25 30		30.00		834.20



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **1"**
Type: **PVC**
Interval: **0 to 5 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 3 ft bls**

SEAL
Type: **Bentonite**
Interval: **3 to 4 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **4 to 30 ft bls**

SCREEN
Diameter: **1"**
Type: **0.010 Slotted PVC**
Interval: **5 to 30 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. MMW-8

MONITORING WELL OWLS DEN LOGS.GPJ S&ME.GDT 9/2/08

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MMW-9

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☒ (list use) methane monitoring

DATE DRILLED 7/11/08

TIME COMPLETED 10:30 AM ☒ PM ☐

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 07.7

LONGITUDE 81 18 28.8

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 20 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: N/A FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0	To 5	Ft.	1"	Sch. 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0	To 3	Ft.	Neat Cement	pour
From 3	To 4	Ft.	Bentonite	pour
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 5	To 20	Ft.	1 in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 4	To 20	Ft.	#2	Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From To	Formation Description
0 to 5	Clayey Silt
5 to 20	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. LITTLE
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

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Charlotte, North Carolina
Telephone: 704-523-4726
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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MMW-9**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 1
Boring Depth (ft): **20.0**	Elevation (ft): **855.6**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/11/08**
Logged By: **Courtney Withers**	Water Level: **N/A**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
855			RESIDUUM: Red, Clayey, **SILT**		
	5		SAPROLITE: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND**		
850					
	10				
845					
	15				
840					
	20				
			Boring Terminated at 20.0 ft bls **Lithology Described From Soil Boring Cuttings**		

COMPLETION REPORT OF WELL No. MMW-9

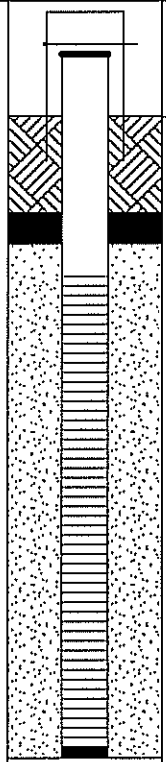
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **N/A**

LATITUDE: **35 29 07.7**
LONGITUDE: **81 18 28.8**
TOP OF CASING ELEVATION: **858.68**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/11/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00		855.61
RESIDUUM: Red, Clayey, **SILT**		0				
				3.00		852.61
				4.00		851.61
SAPROLITE: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND**		5				
		10				
		15				
		20		20.00		835.61



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **1"**
Type: **PVC**
Interval: **0 to 5 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 3 ft bls**

SEAL
Type: **Bentonite**
Interval: **3 to 4 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **4 to 20 ft bls**

SCREEN
Diameter: **1"**
Type: **0.010 Slotted PVC**
Interval: **5 to 20 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MMW-9

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-8

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation☐ Other ☐ (list use)

DATE DRILLED 7/14/08

TIME COMPLETED 3:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 04.0

LONGITUDE 81 18 34.7

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 54 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 49.98 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

From	To	Depth	Diameter	Thickness/ Weight	Material
From 0	To 39	Ft.	2"	Sch. 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

From	To	Depth	Material	Method
From 0	To 34.5	Ft.	Neat Cement	pour
From 34.5	To 36.5	Ft.	Bentonite	pour
From	To	Ft.		

8. SCREEN:

From	To	Depth	Diameter	Slot Size	Material
From 39	To 54	Ft.	2 in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

From	To	Depth	Size	Material
From 36.5	To 54	Ft.	#2	Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From To	Formation Description
0 to 9	Clayey Silt
9 to 29.5	Silty Sand
29.5 to 33	Clayey Silt
33 to 54	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. LITTLE
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-8**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 2
Boring Depth (ft): **55.0**	Elevation (ft): **878.2**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/14/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 47.19 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			RESIDUUM: Red, Micaceous, Clayey, **SILT** With Quartz Rock Fragments		
875					20
	5				
870					11
			SAPROLITE: Reddish-Brown, Very Micaceous, Silty, Fine **SAND**		
	10				
865					9
	15				
860			SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		8
	20				
855					10
	25				
850			SAPROLITE: White and Tan, Medium to Fine **SAND**		7
	30		SAPROLITE: Orange, Micaceous, Slightly Clayey, **SILT** With Manganese Staining		
845			SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining and White, Medium to Fine **SAND** Lenses		10

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-8**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 2 of 2
Boring Depth (ft): **55.0**	Elevation (ft): **878.2**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/14/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 47.19 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
840	40				19
835	45		SAPROLITE: Orange, Black, and Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		11
830	50				14
825	55		SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		26
			Boring Terminated at 55.0 ft bls		

COMPLETION REPORT OF WELL No. MW-8

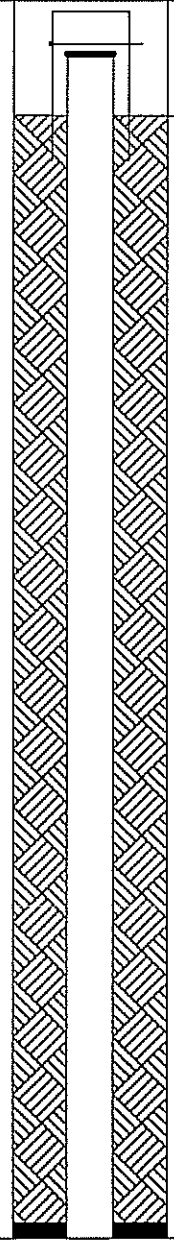
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **Stabilized Water Level at 47.19 ft bls**

LATITUDE: **35 29 04.0**
LONGITUDE: **81 18 34.7**
TOP OF CASING ELEVATION: **881.21**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/14/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00		878.23
RESIDUUM: Red, Micaceous, Clayey, **SILT** With Quartz Rock Fragments		0, 5				
SAPROLITE: Reddish-Brown, Very Micaceous, Silty, Fine **SAND**		10, 15				
SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		20, 25				
SAPROLITE: White and Tan, Medium to Fine **SAND**		30				
SAPROLITE: Orange, Micaceous, Slightly Clayey, **SILT** With Manganese Staining				34.50		843.73



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **0 to 39 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 34.5 ft bls**

SEAL
Type: **Bentonite**
Interval: **34.5 to 36.5 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **36.5 to 54 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **39 to 54 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL OWLS DEN LOGS.GPJ S&ME.GDT 9/2/08

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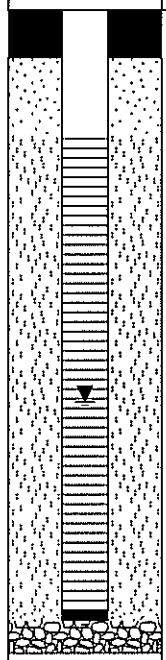
9751 Southern Pine Blvd.
Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MW-8

PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

GROUND SURFACE ELEVATION: **878.2**
LOGGED BY: **Courtney Wither**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining and White, Medium to Fine **SAND** Lenses *(continued)*		35		36.50		841.73	
		40					
SAPROLITE: Orange, Black, and Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		45					
		50					
SAPROLITE: Brown, Tan, and White, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		55		54.00 55.00		824.23 823.23	



LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

9751 Southern Pine Blvd.
Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MW-8

MONITORING WELL OWLS DEN LOGS.GPJ S&ME.GDT 9/2/08

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-9

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation☐ Other ☐ (list use)

DATE DRILLED 7/8/08

TIME COMPLETED 1:00 AM ☐ PM ☒

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 02.8

LONGITUDE 81 18 30.1

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- Is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 60 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 52.30 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2.8 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0	To 45	Ft.	2"	Sch. 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0	To 36	Ft.	Neat Cement	pour
From 36	To 39.5	Ft.	Bentonite	pour
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 45	To 60	Ft.	2 in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 39.5	To 60	Ft.	#2	Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From To	Formation Description
0 to 6	Sandy Silt
6 to 33	Silty Sand
33 to 42	Sandy Silt
42 to 60	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Jay A. Little 8-7-08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JAY A. LITTLE
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

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ENVIRONMENTAL SERVICES

S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, North Carolina
Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-9**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 2
Boring Depth (ft): **61.0**	Elevation (ft): **882.2**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/8/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 48.02 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
880	5		RESIDUUM: Red, Micaceous, Slightly Clayey, Fine Sandy, **SILT**		7
875	10		SAPROLITE: Tan and Reddish-Brown, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		7
870	15				4
865	20				6
860	25				5
855	30				7
850			SAPROLITE: Tan and White, Micaceous, Fine Sandy, **SILT** With Manganese Staining and Medium to Coarse **SAND** Lenses		8

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-9**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 2 of 2
Boring Depth (ft): **61.0**	Elevation (ft): **882.2**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/8/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 48.02 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
845					
	40				9
840			SAPROLITE: Tan and White, Very Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		
	45				10
835			SAPROLITE: Gray and Tan, Very Micaceous, Silty, Medium to Fine **SAND**		
	50				5
830			SAPROLITE: Reddish-Brown, Micaceous, Silty, Fine **SAND**		
	55				7
825					
	60		PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown, Tan, and White, Micaceous, Silty, Medium to Fine **SAND**		50/4 >>
			Auger Refusal at 61.0 ft bls		

COMPLETION REPORT OF WELL No. MW-9

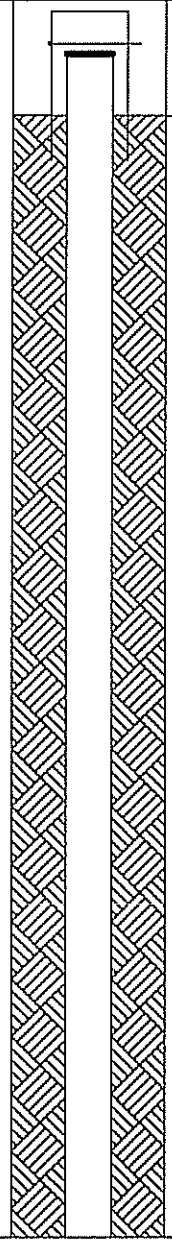
PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **Stabilized Water Level at 48.02 ft bls**

LATITUDE: **35 29 02.8**
LONGITUDE: **81 18 30.1**
TOP OF CASING ELEVATION: **884.94**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/8/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
RESIDUUM: Red, Micaceous, Slightly Clayey, Fine Sandy, **SILT**		0		0.00		882.19
SAPROLITE: Tan and Reddish-Brown, Very Micaceous, Silty, Fine **SAND** With Manganese Staining		5, 10, 15, 20, 25, 30				



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **0 to 45 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 36 ft bls**

SEAL
Type: **Bentonite**
Interval: **36 to 39.5 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **39.5 to 60 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **45 to 60 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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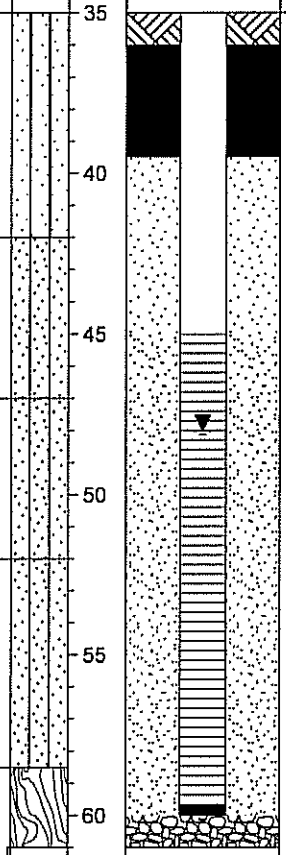
Charlotte, North Carolina

COMPLETION REPORT OF WELL No. MW-9

PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

GROUND SURFACE ELEVATION: **882.2**
LOGGED BY: **Courtney Wither**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SAPROLITE: Tan and White, Micaceous, Fine Sandy, **SILT** With Manganese Staining and Medium to Coarse **SAND** Lenses *(continued)*		35		36.00		846.19	
		40		39.50		842.69	
SAPROLITE: Tan and White, Very Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		45					
SAPROLITE: Gray and Tan, Very Micaceous, Silty, Medium to Fine **SAND**		50					
SAPROLITE: Reddish-Brown, Micaceous, Silty, Fine **SAND**		55					
PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown, Tan, and White, Micaceous, Silty, Medium to Fine **SAND**		60		60.00 61.00		822.19 821.19	



LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. MW-9

MONITORING WELL OWLS DEN LOGS.GPJ S&ME.GDT 9/2/08

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2717

1. WELL CONTRACTOR:

Jay Little
Well Contractor (Individual) Name

S&ME, Inc.
Well Contractor Company Name

STREET ADDRESS 9751 Southern Pine Blvd

Charlotte, North Carolina 28273
City or Town State Zip Code

(704)- 523-4726
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-10

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use)

DATE DRILLED 7/10/08

TIME COMPLETED 10:00 AM ☒ PM ☐

3. WELL LOCATION:

CITY: Lincolnton COUNTY Lincoln

Owls Den Road
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE 35 29 07.0

LONGITUDE 81 18 26.5

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Owls Den Landfill

STREET ADDRESS Owls Den Road

Lincolnton, North Carolina
City or Town State Zip Code

CONTACT PERSON Nancy Rickard

MAILING ADDRESS 5291 Crouse Road

Crouse, North Carolina 28033
City or Town State Zip Code

(704)- 732-9030
Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 48 ft bls

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 45.55 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 2.8 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): METHOD OF TEST

f. DISINFECTION: Type Amount

g. WATER ZONES (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth From	Depth To	Diameter	Thickness/ Weight	Material
	0	33 Ft.	2"	Sch. 40	PVC
		Ft.			
		Ft.			

7. GROUT:

	Depth From	Depth To	Material	Method
	0	29 Ft.	Neat Cement	pour
	29	31.3 Ft.	Bentonite	pour
		Ft.		

8. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	33	48 Ft.	2 in.	0.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth From	Depth To	Size	Material
31.3	48 Ft.	#2	Silica Sand
	Ft.		
	Ft.		

10. DRILLING LOG

From To	Formation Description
0 to 48	Silty Sand

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR 8-7-08 DATE

PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

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Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-10**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 1 of 2
Boring Depth (ft): **50.0**	Elevation (ft): **864.3**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/10/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 42.59 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			RESIDUUM: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		
860	5				7
			SAPROLITE: Brown, Orange, White, and Black, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		
855	10				6
850	15				5
845	20				6
840	25				6
835	30				9
			SAPROLITE: Alternating Horizontal Layers of Black and Tan, Very Micaceous, **SILT** and White, Medium to Fine **SAND**		
830					6

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Owls Den Landfill Site Assessment**			**Boring No. MW-10**
Location: **Lincolnton, North Carolina**		Number: **1356-08-002**	Sheet No. 2 of 2
Boring Depth (ft): **50.0**	Elevation (ft): **864.3**	Driller: **Jay Little, NC Cert No. 2717**	Date Drilled: **7/10/08**
Logged By: **Courtney Withers**	Water Level: **Stabilized Water Level at 42.59 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
825	40				12
820	45				11
815	50				21
			Boring Terminated at 50.0 ft bls		

COMPLETION REPORT OF WELL No. MW-10

PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

WATER LEVEL: **Stabilized Water Level at 42.59 ft bls**

LATITUDE: **35 29 07.0**
LONGITUDE: **81 18 26.5**
TOP OF CASING ELEVATION: **867.11**
DATUM:
LOGGED BY: **Courtney Withers**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **7/10/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00		864.33
RESIDUUM: Reddish-Brown, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		0				
		5				
SAPROLITE: Brown, Orange, White, and Black, Micaceous, Silty, Medium to Fine **SAND** With Manganese Staining		10				
		15				
		20				
		25				
		30		29.00		835.33
				31.30		833.03

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter: **4" X 4"**
Type: **Lockable Steel**
Interval: **Above Grade**

RISER CASING
Diameter: **2"**
Type: **PVC**
Interval: **0 to 33 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 29 ft bls**

SEAL
Type: **Bentonite**
Interval: **29 to 31.3 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **31.3 to 48 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **33 to 48 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC TOP OF CASING
GS GROUND SURFACE
BS BENTONITE SEAL
FP FILTER PACK
TSC TOP OF SCREEN
BSC BOTTOM OF SCREEN
TD TOTAL DEPTH
CG CEMENT GROUT

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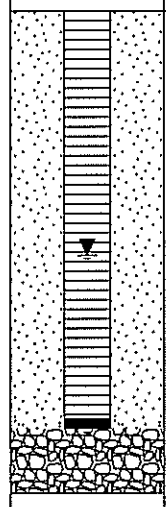
COMPLETION REPORT OF WELL No. MW-10

PROJECT: **Owls Den Landfill Site Assessment**
PROJECT NO: **1356-08-002**
PROJECT LOCATION: **Lincolnton, North Carolina**

GROUND SURFACE ELEVATION:
LOGGED BY: **864.3**
CHECKED BY: **Courtney Withei**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SAPROLITE: Alternating Horizontal Layers of Black and Tan, Very Micaceous, **SILT** and White, Medium to Fine **SAND** *(continued)*		35 40 45 50		48.00 50.00		816.33 814.33	



LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. MW-10

MONITORING WELL OWLS DEN LOGS.GPJ S&ME.GDT 9/2/08

APPENDIX II

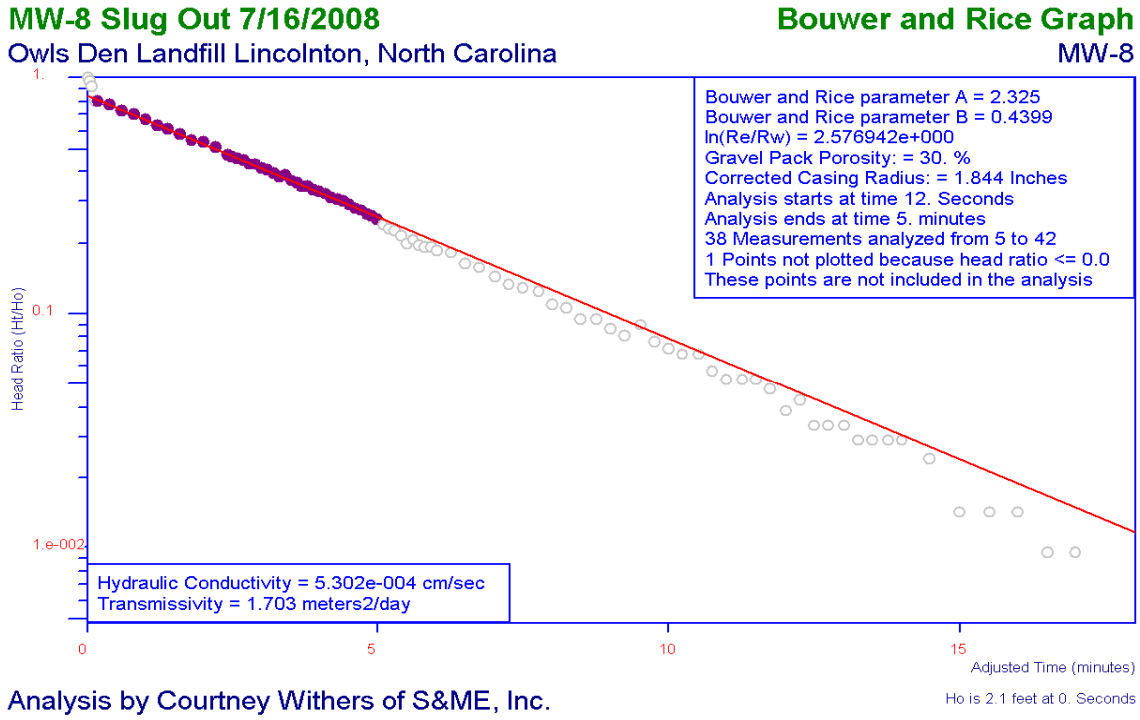
SLUG TEST CALCULATION SHEETS

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	Owl's Den Landfill
Test Date:	7/16/2008
Well Label:	MW-8
Aquifer Thickness:	12.2 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	46.8 feet
Water Table to Screen Bottom:	7.2 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 91 time and drawdown measurements
Maximum head is 2.1feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Courtney Withers of S&ME, Inc.

PERMEABILITY

5.302×10^{-04} cm/sec

Calculation of Permeability By The Rising Head Method (Slug Test)

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0	0	48.9	2.1	1
2	5.00E-02	0.05	48.86	2.06	0.981
3	0.1	0.1	48.73	1.93	0.919
4	0.15	0.15	48.49	1.69	0.8048
5	0.2	0.2	48.48	1.68	0.8
6	0.4	0.4	48.42	1.62	0.7714
7	0.6	0.6	48.34	1.54	0.7333
8	0.8	0.8	48.27	1.47	0.7
9	1	1	48.19	1.39	0.6619
10	1.2	1.2	48.13	1.33	0.6333
11	1.4	1.4	48.07	1.27	0.6048
12	1.6	1.6	48.02	1.22	0.581
13	1.8	1.8	47.95	1.15	0.5476
14	2	2	47.92	1.12	0.5333
15	2.2	2.2	47.86	1.06	0.5048
16	2.4	2.4	47.8	1	0.4762
17	2.5	2.5	47.78	0.98	0.4667
18	2.6	2.6	47.76	0.96	0.4571
19	2.7	2.7	47.74	0.94	0.4476
20	2.8	2.8	47.71	0.91	0.4333
21	2.9	2.9	47.7	0.9	0.4286
22	3	3	47.67	0.87	0.4143
23	3.1	3.1	47.66	0.86	0.4095
24	3.2	3.2	47.63	0.83	0.3952
25	3.3	3.3	47.6	0.8	0.381
26	3.4	3.4	47.61	0.81	0.3857
27	3.5	3.5	47.57	0.77	0.3667
28	3.6	3.6	47.55	0.75	0.3571
29	3.7	3.7	47.53	0.73	0.3476
30	3.8	3.8	47.53	0.73	0.3476
31	3.9	3.9	47.5	0.7	0.3333
32	4	4	47.49	0.69	0.3286
33	4.1	4.1	47.48	0.68	0.3238
34	4.2	4.2	47.46	0.66	0.3143
35	4.3	4.3	47.44	0.64	0.3048
36	4.4	4.4	47.43	0.63	0.3
37	4.5	4.5	47.41	0.61	0.2905
38	4.6	4.6	47.39	0.59	0.281
39	4.7	4.7	47.38	0.58	0.2762
40	4.8	4.8	47.36	0.56	0.2667
41	4.9	4.9	47.35	0.55	0.2619
42	5	5	47.33	0.53	0.2524
43	5.1	5.1	47.3	0.5	0.2381
44	5.2	5.2	47.28	0.48	0.2286
45	5.3	5.3	47.27	0.47	0.2238
46	5.4	5.4	47.25	0.45	0.2143
47	5.5	5.5	47.22	0.42	0.2

Calculation of Permeability By The Rising Head Method (Slug Test)

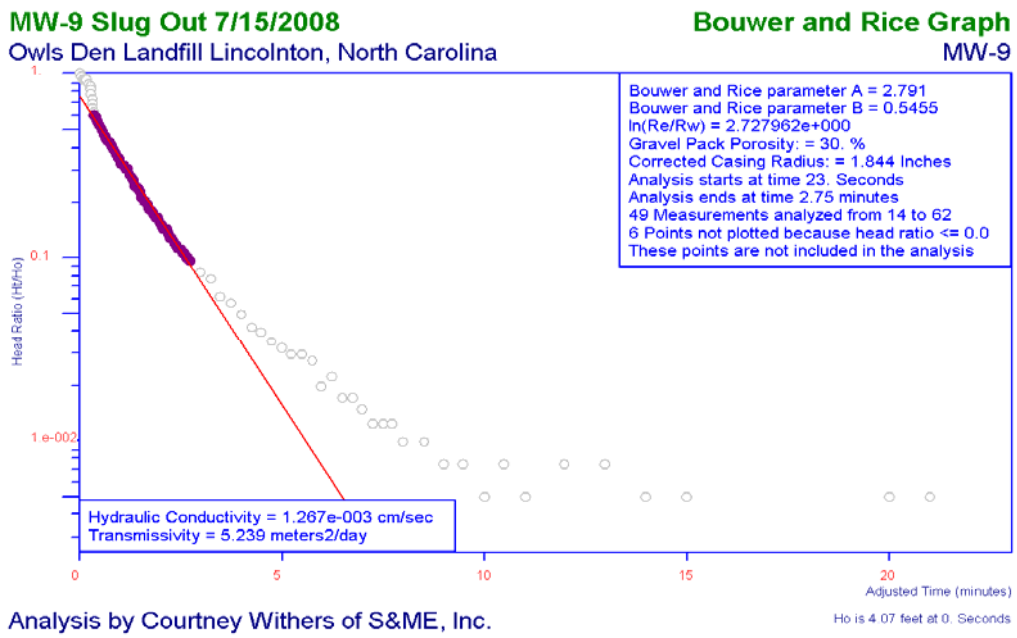
Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
48	5.6	5.6	47.23	0.43	0.2048
49	5.7	5.7	47.21	0.41	0.1952
50	5.8	5.8	47.2	0.4	0.1905
51	5.9	5.9	47.2	0.4	0.1905
52	6	6	47.19	0.39	0.1857
53	6.25	6.25	47.18	0.38	0.1810
54	6.5	6.5	47.14	0.34	0.1619
55	6.75	6.75	47.13	0.33	0.1571
56	7	7	47.1	0.3	0.1429
57	7.25	7.25	47.08	0.28	0.1333
58	7.5	7.5	47.07	0.27	0.1286
59	7.75	7.75	47.06	0.26	0.1238
60	8	8	47.03	0.23	0.1095
61	8.25	8.25	47.02	0.22	0.1048
62	8.5	8.5	47	0.2	0.0952
63	8.75	8.75	47	0.2	0.0952
64	9	9	46.98	0.18	0.0857
65	9.25	9.25	46.97	0.17	0.0810
66	9.5	9.5	46.99	0.19	0.0905
67	9.75	9.75	46.96	0.16	0.0762
68	10	10	46.95	0.15	0.0714
69	10.25	10.25	46.94	0.14	0.0667
70	10.5	10.5	46.94	0.14	0.0667
71	10.75	10.75	46.92	0.12	0.0571
72	11	11	46.91	0.11	0.0524
73	11.25	11.25	46.91	0.11	0.0524
74	11.5	11.5	46.91	0.11	0.0524
75	11.75	11.75	46.9	0.10	0.0476
76	12	12	46.88	0.08	0.0381
77	12.25	12.25	46.89	0.09	0.0429
78	12.5	12.5	46.87	0.07	0.0333
79	12.75	12.75	46.87	0.07	0.0333
80	13	13	46.87	0.07	0.0333
81	13.25	13.25	46.86	0.06	0.0286
82	13.5	13.5	46.86	0.06	0.0286
83	13.75	13.75	46.86	0.06	0.0286
84	14	14	46.86	0.06	0.0286
85	14.5	14.5	46.85	0.05	0.0238
86	15	15	46.83	0.03	0.0143
87	15.5	15.5	46.83	0.03	0.0143
88	16	16	46.83	0.03	0.0143
89	16.5	16.5	46.82	0.02	0.0095
90	17	17	46.82	0.02	0.0095
91	18	18	46.81	0.01	0.0048

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	Owl's Den Landfill
Test Date:	7/15/2008
Well Label:	MW-9
Aquifer Thickness:	15.7 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	49.3 feet
Water Table to Screen Bottom:	10.7 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 101 time and drawdown measurements
Maximum head is 4.07 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Courtney Withers of S&ME, Inc.

PERMEABILITY

1.267×10^{-03} cm/sec

Calculation of Permeability By The Rising Head Method (Slug Test)

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0	0	53.37	4.07	1
2	0.05	0.05	53.25	3.95	0.9705
3	0.1	0.1	53.1	3.8	0.9337
4	0.15	0.15	53.1	3.8	0.9337
5	0.2	0.2	53.07	3.77	0.9263
6	0.25	0.25	52.89	3.59	0.8821
7	0.2667	0.2667	52.83	3.53	0.8673
8	0.2833	0.2833	52.67	3.37	0.828
9	0.3	0.3	52.45	3.15	0.774
10	0.3167	0.3167	52.25	2.95	0.7248
11	0.3333	0.3333	52.1	2.8	0.688
12	0.35	0.35	51.94	2.64	0.6486
13	0.3667	0.3667	51.84	2.54	0.6241
14	0.3833	0.3833	51.75	2.45	0.602
15	0.4	0.4	51.67	2.37	0.5823
16	0.45	0.45	51.55	2.25	0.5528
17	0.5	0.5	51.45	2.15	0.5283
18	0.55	0.55	51.36	2.06	0.5061
19	0.6	0.6	51.27	1.97	0.484
20	0.65	0.65	51.18	1.88	0.4619
21	0.7	0.7	51.1	1.8	0.4423
22	0.75	0.75	51.02	1.72	0.4226
23	0.8	0.8	50.96	1.66	0.4079
24	0.85	0.85	50.88	1.58	0.3882
25	0.9	0.9	50.83	1.53	0.3759
26	0.95	0.95	50.77	1.47	0.3612
27	1	1	50.71	1.41	0.3464
28	1.05	1.05	50.62	1.32	0.3243
29	1.1	1.1	50.59	1.29	0.317
30	1.15	1.15	50.54	1.24	0.3047
31	1.2	1.2	50.53	1.23	0.3022
32	1.25	1.25	50.45	1.15	0.2826
33	1.3	1.3	50.42	1.12	0.2752
34	1.35	1.35	50.37	1.07	0.2629
35	1.4	1.4	50.3	1	0.2457
36	1.45	1.45	50.28	0.98	0.2408
37	1.5	1.5	50.23	0.93	0.2285
38	1.55	1.55	50.17	0.87	0.2138
39	1.6	1.6	50.13	0.83	0.2039
40	1.65	1.65	50.12	0.82	0.2015
41	1.7	1.7	50.09	0.79	0.1941
42	1.75	1.75	50.05	0.75	0.1843
43	1.8	1.8	50.02	0.72	0.1769
44	1.85	1.85	49.99	0.69	0.1695
45	1.9	1.9	49.98	0.68	0.1671
46	1.95	1.95	49.97	0.67	0.1646
47	2	2	49.93	0.63	0.1548
48	2.05	2.05	49.91	0.61	0.1499
49	2.1	2.1	49.89	0.59	0.145
50	2.15	2.15	49.88	0.58	0.1425

Calculation of Permeability By The Rising Head Method (Slug Test)

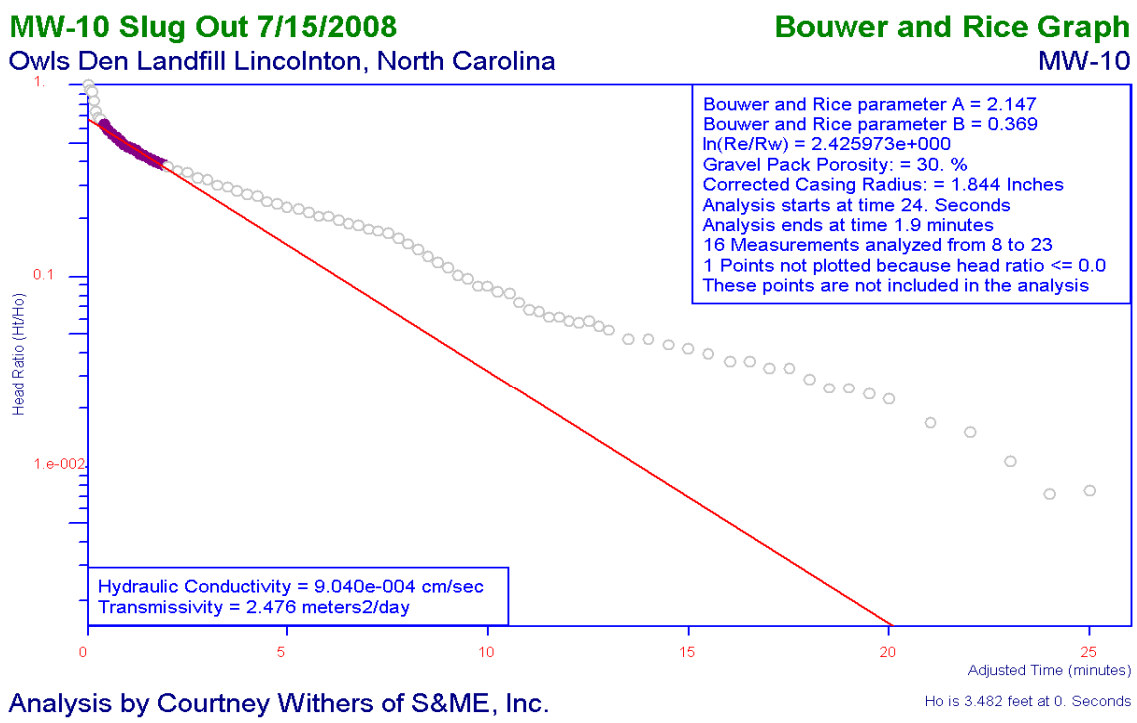
Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
51	2.2	2.2	49.85	0.55	0.1351
52	2.25	2.25	49.82	0.52	0.1278
53	2.3	2.3	49.82	0.52	0.1278
54	2.35	2.35	49.8	0.5	0.1229
55	2.4	2.4	49.78	0.48	0.1179
56	2.45	2.45	49.76	0.46	0.1130
57	2.5	2.5	49.75	0.45	0.1106
58	2.55	2.55	49.73	0.43	0.1057
59	2.6	2.6	49.73	0.43	0.1057
60	2.65	2.65	49.71	0.41	0.1007
61	2.7	2.7	49.71	0.41	0.1007
62	2.75	2.75	49.69	0.39	0.0958
63	3	3	49.64	0.34	0.0835
64	3.25	3.25	49.61	0.31	0.0762
65	3.5	3.5	49.55	0.25	0.0614
66	3.75	3.75	49.53	0.23	0.0565
67	4	4	49.5	0.2	0.0491
68	4.25	4.25	49.47	0.17	0.0418
69	4.5	4.5	49.46	0.16	0.0393
70	4.75	4.75	49.44	0.14	0.0344
71	5	5	49.43	0.13	0.0319
72	5.25	5.25	49.42	0.12	0.0295
73	5.5	5.5	49.42	0.12	0.0295
74	5.75	5.75	49.41	0.11	0.0270
75	6	6	49.38	0.08	0.0197
76	6.25	6.25	49.39	0.09	0.0221
77	6.5	6.5	49.37	0.07	0.0172
78	6.75	6.75	49.37	0.07	0.0172
79	7	7	49.36	0.06	0.0147
80	7.25	7.25	49.35	0.05	0.0123
81	7.5	7.5	49.35	0.05	0.0123
82	7.75	7.75	49.35	0.05	0.0123
83	8	8	49.34	0.04	0.0098
84	8.5	8.5	49.34	0.04	0.0098
85	9	9	49.33	0.03	0.0074
86	9.5	9.5	49.33	0.03	0.0074
87	10	10	49.32	0.02	0.0049
88	10.5	10.5	49.33	0.03	0.0074
89	11	11	49.32	0.02	0.0049
90	12	12	49.33	0.03	0.0074
91	13	13	49.33	0.03	0.0074
92	14	14	49.32	0.02	0.0049
93	15	15	49.32	0.02	0.0049
94	16	16	49.31	0.01	0.0025
95	17	17	49.31	0.01	0.0025
96	18	18	49.3	0	0
97	19	19	49.3	0	0
98	20	20	49.32	0.02	0.0049
99	21	21	49.32	0.02	0.0049
100	22	22	49.3	0	0
101	23	23	49.31	0.01	0.0025

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	Owl's Den Landfill
Test Date:	7/15/2008
Well Label:	MW-10
Aquifer Thickness:	10.4 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	42.6 feet
Water Table to Screen Bottom:	5.4 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 88 time and drawdown measurements
Maximum head is 3.482 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Courtney Withers of S&ME, Inc.

PERMEABILITY

9.040×10^{-04} cm/sec

Calculation of Permeability By The Rising Head Method (Slug Test)

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0	0	46.08	3.482	1
2	0.05	0.05	45.89	3.29	0.9449
3	0.1	0.1	45.83	3.228	0.9271
4	0.15	0.15	45.47	2.874	0.8254
5	0.2	0.2	45.12	2.518	0.7231
6	0.25	0.25	44.97	2.368	0.6801
7	0.3	0.3	44.89	2.294	0.6588
8	0.4	0.4	44.75	2.151	0.6177
9	0.5	0.5	44.62	2.021	0.5804
10	0.6	0.6	44.53	1.934	0.5554
11	0.7	0.7	44.45	1.846	0.5302
12	0.8	0.8	44.37	1.771	0.5086
13	0.9	0.9	44.31	1.706	0.4899
14	1	1	44.25	1.654	0.475
15	1.1	1.1	44.22	1.616	0.4641
16	1.2	1.2	44.17	1.574	0.452
17	1.3	1.3	44.12	1.521	0.4368
18	1.4	1.4	44.09	1.485	0.4265
19	1.5	1.5	44.05	1.448	0.4159
20	1.6	1.6	44.03	1.427	0.4098
21	1.7	1.7	43.98	1.379	0.396
22	1.8	1.8	43.96	1.362	0.3912
23	1.9	1.9	43.93	1.329	0.3817
24	2	2	43.9	1.299	0.3731
25	2.25	2.25	43.84	1.244	0.3573
26	2.5	2.5	43.81	1.209	0.3472
27	2.75	2.75	43.74	1.145	0.3288
28	3	3	43.71	1.109	0.3185
29	3.25	3.25	43.65	1.051	0.3018
30	3.5	3.5	43.61	1.013	0.2909
31	3.75	3.75	43.57	0.969	0.2783
32	4	4	43.53	0.932	0.2677
33	4.25	4.25	43.51	0.907	0.2605
34	4.5	4.5	43.46	0.864	0.2481
35	4.75	4.75	43.43	0.833	0.2392
36	5	5	43.4	0.797	0.2289
37	5.25	5.25	43.38	0.783	0.2249
38	5.5	5.5	43.35	0.751	0.2157
39	5.75	5.75	43.32	0.721	0.2071
40	6	6	43.31	0.709	0.2036
41	6.25	6.25	43.28	0.678	0.1947
42	6.5	6.5	43.25	0.653	0.1875
43	6.75	6.75	43.25	0.647	0.1858
44	7	7	43.21	0.609	0.1749
45	7.25	7.25	43.2	0.602	0.1729
46	7.5	7.5	43.19	0.589	0.1692
47	7.75	7.75	43.15	0.545	0.1565

Calculation of Permeability By The Rising Head Method (Slug Test)

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
48	8	8	43.12	0.515	0.1479
49	8.25	8.25	43.08	0.478	0.1373
50	8.5	8.5	43.04	0.439	0.1261
51	8.75	8.75	43.01	0.412	0.1183
52	9	9	42.99	0.387	0.1111
53	9.25	9.25	42.96	0.356	0.1022
54	9.5	9.5	42.94	0.336	0.0965
55	9.75	9.75	42.91	0.311	0.0893
56	10	10	42.91	0.306	0.0879
57	10.25	10.25	42.89	0.289	0.0830
58	10.5	10.5	42.88	0.285	0.0819
59	10.75	10.75	42.85	0.251	0.0721
60	11	11	42.83	0.234	0.0672
61	11.25	11.25	42.83	0.228	0.0655
62	11.5	11.5	42.81	0.211	0.0606
63	11.75	11.75	42.81	0.213	0.0612
64	12	12	42.8	0.204	0.0586
65	12.25	12.25	42.8	0.199	0.0572
66	12.5	12.5	42.8	0.202	0.0580
67	12.75	12.75	42.79	0.188	0.0540
68	13	13	42.78	0.183	0.0526
69	13.5	13.5	42.76	0.162	0.0465
70	14	14	42.76	0.16	0.0468
71	14.5	14.5	42.75	0.15	0.0437
72	15	15	42.74	0.15	0.0416
73	15.5	15.5	42.74	0.14	0.0391
74	16	16	42.72	0.12	0.0356
75	16.5	16.5	42.72	0.12	0.0356
76	17	17	42.71	0.11	0.0327
77	17.5	17.5	42.72	0.12	0.0330
78	18	18	42.7	0.10	0.0284
79	18.5	18.5	42.69	0.09	0.0259
80	19	19	42.69	0.09	0.0259
81	19.5	19.5	42.68	0.08	0.0238
82	20	20	42.68	0.08	0.0227
83	21	21	42.66	0.06	0.0169
84	22	22	42.65	0.05	0.0152
85	23	23	42.64	0.04	0.0106
86	24	24	42.63	0.03	0.0072
87	25	25	42.63	0.03	0.0075
88	26	26	42.6	0.01	0.0014

APPENDIX III

WELL SAMPLING LOGS
LABORATORY GROUNDWATER ANALYTICAL DATA

Project Name: Owl's Den Landfill Assessment
Project Location: Lincoln County, North Carolina
Project Number: 1356-08-002

Well ID MW-8

Sampling Personnel (1) Tom Steelman (2)
Weather Conditions Sunny/Hot
Unusual Site Conditions

Water Level Data

Measuring Point Location TOC
Well Casing Volume 1.1
Depth to Water (ft) 49.98
Depth to Base of Well (ft) 56.80 ft
(well casing volume = water column*0.174)
Water Column (ft) 6.8
Equipment Used to Measure Depths Electronic Water Level Probe

Well Purging Data

Date 7/21/2008
Purging Equipment Disposable Teflon Bailer

	Total Voume (Gal)	Time	pH	Temp (ºC)	Conductance (µS)
Initial	0	14:40	5.45	19.5	75
	1.1	14:44	5.33	18.8	75
	2.2	14:48	5.31	18.1	73
Final	3.4	14:51	5.35	17.3	72

Well Sampling Data

Sampling Date 7/22/2008
Sampling Time 8:15
Sampling Equipment Disposable Teflon Bailer
Sample Observations clear

Analytical Data

Method	Container Type and No.	Preservation
Method 8260	(3) 40 ml glass vials	HCL
RCRA Metals	(1) 250 ml plastic bottles	HNO3

Comments

Project Name: Owl's Den Landfill Assessment
Project Location: Lincoln County, North Carolina
Project Number: 1356-08-002

Well ID MW-9

Sampling Personnel (1) Tom Steelman (2)
Weather Conditions Sunny/Hot
Unusual Site Conditions

Water Level Data

Measuring Point Location TOC
Well Casing Volume 2.0
Depth to Water (ft) 52.3
Depth to Base of Well (ft) 64.28 ft
(well casing volume = water column*0.174)
Water Column (ft) 12.0
Equipment Used to Measure Depths Electronic Water Level Probe

Well Purging Data

Date 7/21/2008
Purging Equipment Disposable Teflon Bailer

	Total Voume (Gal)	Time	pH	Temp (ºC)	Conductance (µS)
Initial	0	14:14	6.30	21.2	293
	2.0	14:17	6.15	19.9	258
	3.9	14:22	6.12	19.4	251
Final	5.9	14:27	6.10	19.0	242

Well Sampling Data

Sampling Date 7/22/2008
Sampling Time 8:00
Sampling Equipment Disposable Teflon Bailer
Sample Observations clear

Analytical Data

Method	Container Type and No.	Preservation
Method 8260	(3) 40 ml glass vials	HCL
RCRA Metals	(1) 250 ml plastic bottles	HNO3

Comments

Project Name: Owl's Den Landfill Assessment
Project Location: Lincoln County, North Carolina
Project Number: 1356-08-002

Well ID MW-10

Sampling Personnel (1) Tom Steelman (2)
Weather Conditions Sunny/Hot
Unusual Site Conditions

Water Level Data

Measuring Point Location TOC
Well Casing Volume 0.9
Depth to Water (ft) 45.55
Depth to Base of Well (ft) 50.96 ft
(well casing volume = water column*0.174)
Water Column (ft) 5.4
Equipment Used to Measure Depths Electronic Water Level Probe

Well Purging Data

Date 7/21/2008
Purging Equipment Disposable Teflon Bailer

	Total Voume (Gal)	Time	pH	Temp (ºC)	Conductance (µS)
Initial	0	15:17	6.36	21.2	115
	0.9	15:19	6.44	19.5	122
	1.8	15:22	6.38	19.1	111
Final					

Well Sampling Data

Sampling Date 7/22/2008
Sampling Time 8:30
Sampling Equipment Disposable Teflon Bailer
Sample Observations clear

Analytical Data

Method	Container Type and No.	Preservation
Method 8260	(3) 40 ml glass vials	HCL
RCRA Metals	(1) 250 ml plastic bottles	HNO3

Comments dry at 1.78 gallons

Environmental Conservation Laboratories, Inc.
102-A Woodwinds Industrial Court
Cary NC, 27511
Phone: 919.467.3090 FAX: 919.467.3515
www.encolabs.com

Wednesday, July 30, 2008

S&ME, Inc. (SM002)

Attn: Courtney Withers

9751 Southern Pine Blvd.

Charlotte, NC 28273

RE: Laboratory Results for
Project Number: 1356-07-006, Project Name/Desc: Owl's Den LF - Groundwater
ENCO Workorder: C807430

Dear Courtney Withers,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Wednesday, July 23, 2008.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Chuck Smith

Project Manager

Enclosure(s)

The total number of pages in this report, including this page is 20.

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SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: MW-8 **Lab ID:** C807430-01 **Sampled:** 07/22/08 08:15 **Received:** 07/23/08 10:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	01/18/09	07/24/08 06:38	7/26/2008 12:43
EPA 7470A	08/19/08	07/24/08 07:12	7/25/2008 14:36
EPA 8260B	08/05/08	07/28/08 10:27	7/29/2008 11:49

Client ID: MW-9 **Lab ID:** C807430-02 **Sampled:** 07/22/08 08:00 **Received:** 07/23/08 10:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	01/18/09	07/24/08 06:38	7/26/2008 12:50
EPA 7470A	08/19/08	07/24/08 07:12	7/25/2008 14:40
EPA 8260B	08/05/08	07/28/08 10:27	7/29/2008 12:19

Client ID: MW-10 **Lab ID:** C807430-03 **Sampled:** 07/22/08 08:30 **Received:** 07/23/08 10:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 6010B	01/18/09	07/24/08 06:38	7/26/2008 12:57
EPA 7470A	08/19/08	07/24/08 07:12	7/25/2008 14:43
EPA 8260B	08/05/08	07/28/08 10:27	7/29/2008 12:49

Client ID: TRIP **Lab ID:** C807430-04 **Sampled:** 07/22/08 08:00 **Received:** 07/23/08 10:00

Parameter	Hold Date/Time(s)	Prep Date/Time(s)	Analysis Date/Time(s)
EPA 8260B	08/05/08	07/28/08 10:27	7/29/2008 11:20

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SAMPLE DETECTION SUMMARY

Client ID: MW-8 **Lab ID:** C807430-01

Analyte	Results	Flag	MRL	Units	Method	Notes
2-Chlorotoluene	2.6		1.0	ug/L	EPA 8260B	
Barium	333		10.0	ug/L	EPA 6010B	
Xylenes (Total)	1.9		1.0	ug/L	EPA 8260B	

Client ID: MW-9 **Lab ID:** C807430-02

Analyte	Results	Flag	MRL	Units	Method	Notes
Acetone	2.1	J	5.0	ug/L	EPA 8260B	
Barium	380		10.0	ug/L	EPA 6010B	
Chloroform	4.1		1.0	ug/L	EPA 8260B	
Xylenes (Total)	0.88	J	1.0	ug/L	EPA 8260B	

Client ID: MW-10 **Lab ID:** C807430-03

Analyte	Results	Flag	MRL	Units	Method	Notes
Barium	193		10.0	ug/L	EPA 6010B	
Chloroform	2.5		1.0	ug/L	EPA 8260B	

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ANALYTICAL RESULTS

Description: MW-8
Matrix: Ground Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-01
Sampled: 07/22/08 08:15
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
1,1,1,2-Tetrachloroethane [630-20-6] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1,1-Trichloroethane [71-55-6] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1,2,2-Tetrachloroethane [79-34-5] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1,2-Trichloroethane [79-00-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1-Dichloroethane [75-34-3] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1-Dichloroethene [75-35-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,1-Dichloropropene [563-58-6] ^	0.32	U	ug/L	1	0.32	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2,3-Trichlorobenzene [87-61-6] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2,3-Trichloropropane [96-18-4] ^	0.47	U	ug/L	1	0.47	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2,4-Trichlorobenzene [120-82-1] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2,4-Trimethylbenzene [95-63-6] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2-Dibromo-3-chloropropane [96-12-8] ^	0.48	U	ug/L	1	0.48	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2-Dibromoethane [106-93-4] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2-Dichlorobenzene [95-50-1] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2-Dichloroethane [107-06-2] ^	0.46	U	ug/L	1	0.46	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,2-Dichloropropane [78-87-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,3,5-Trimethylbenzene [108-67-8] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,3-Dichlorobenzene [541-73-1] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,3-Dichloropropane [142-28-9] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
1,4-Dichlorobenzene [106-46-7] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
2,2-Dichloropropane [594-20-7] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
2-Butanone [78-93-3] ^	0.44	U	ug/L	1	0.44	5.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
2-Chloroethyl Vinyl Ether [110-75-8] ^	0.37	U	ug/L	1	0.37	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
2-Chlorotoluene [95-49-8] ^	**2.6**		ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
2-Hexanone [591-78-6] ^	0.60	U	ug/L	1	0.60	5.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
4-Chlorotoluene [106-43-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
4-Isopropyltoluene [99-87-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
4-Methyl-2-pentanone [108-10-1] ^	0.56	U	ug/L	1	0.56	5.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Acetone [67-64-1] ^	0.62	U	ug/L	1	0.62	5.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Benzene [71-43-2] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Bromobenzene [108-86-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Bromochloromethane [74-97-5] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Bromodichloromethane [75-27-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Bromoform [75-25-2] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Bromomethane [74-83-9] ^	0.49	U	ug/L	1	0.49	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Carbon disulfide [75-15-0] ^	0.40	U	ug/L	1	0.40	5.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Carbon tetrachloride [56-23-5] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Chlorobenzene [108-90-7] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Chloroethane [75-00-3] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Chloroform [67-66-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Chloromethane [74-87-3] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
cis-1,2-Dichloroethene [156-59-2] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
cis-1,3-Dichloropropene [10061-01-5] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Dibromochloromethane [124-48-1] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Dibromomethane [74-95-3] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Dichlorodifluoromethane [75-71-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Ethylbenzene [100-41-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Hexachlorobutadiene [87-68-3] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	

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Description:	MW-8	**Lab Sample ID:**	C807430-01	**Received:**	07/23/08 10:00
Matrix:	Ground Water	**Sampled:**	07/22/08 08:15	**Work Order:**	C807430
Project:	Owl's Den LF - Groundwater	**Sampled By:**	Tom Steelman		

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Isopropylbenzene [98-82-8] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Methylene chloride [75-09-2] ^	0.24	U	ug/L	1	0.24	2.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Methyl-tert-Butyl Ether [1634-04-4] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Naphthalene [91-20-3] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
n-Butyl Benzene [104-51-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
n-Propyl Benzene [103-65-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
sec-Butylbenzene [135-98-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Styrene [100-42-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
tert-Butylbenzene [98-06-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Tetrachloroethene [127-18-4] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Toluene [108-88-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
trans-1,2-Dichloroethene [156-60-5] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
trans-1,3-Dichloropropene [10061-02-6] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Trichloroethene [79-01-6] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Trichlorofluoromethane [75-69-4] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Vinyl chloride [75-01-4] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	
Xylenes (Total) [1330-20-7]	**1.9**		ug/L	1	0.40	1.0	8G28021	EPA 8260B	07/29/08 11:49	jkg	

Surrogates	*Results*	*DF*	*Spike Lvl*	*% Rec*	*% Rec Limits*	*Batch*	*Method*	*Analyzed*	*By*	Notes
4-Bromofluorobenzene	*56*	*1*	*50.0*	*112 %*	*69-120*	*8G28021*	*EPA 8260B*	*07/29/08 11:49*	*jkg*	
Dibromofluoromethane	*46*	*1*	*50.0*	*92 %*	*61-120*	*8G28021*	*EPA 8260B*	*07/29/08 11:49*	*jkg*	
Toluene-d8	*47*	*1*	*50.0*	*93 %*	*75-99*	*8G28021*	*EPA 8260B*	*07/29/08 11:49*	*jkg*	

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Description: MW-8
Matrix: Ground Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-01
Sampled: 07/22/08 08:15
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Metals by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Arsenic [7440-38-2] ^	2.8	U	ug/L	1	2.8	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Barium [7440-39-3] ^	**333**		ug/L	1	1.00	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Cadmium [7440-43-9] ^	0.36	U	ug/L	1	0.36	1.00	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Chromium [7440-47-3] ^	1.0	U	ug/L	1	1.0	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Lead [7439-92-1] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Mercury [7439-97-6] ^	0.11	U	ug/L	1	0.11	0.20	8G24003	EPA 7470A	07/25/08 14:36	MPL	
Selenium [7782-49-2] ^	2.7	U	ug/L	1	2.7	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	
Silver [7440-22-4] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:43	JDH	

This report relates only to the sample as received by the laboratory, and may only be reproduced in full.

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Description: MW-9
Matrix: Ground Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-02
Sampled: 07/22/08 08:00
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
1,1,1,2-Tetrachloroethane [630-20-6] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1,1-Trichloroethane [71-55-6] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1,2,2-Tetrachloroethane [79-34-5] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1,2-Trichloroethane [79-00-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1-Dichloroethane [75-34-3] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1-Dichloroethene [75-35-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,1-Dichloropropene [563-58-6] ^	0.32	U	ug/L	1	0.32	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2,3-Trichlorobenzene [87-61-6] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2,3-Trichloropropane [96-18-4] ^	0.47	U	ug/L	1	0.47	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2,4-Trichlorobenzene [120-82-1] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2,4-Trimethylbenzene [95-63-6] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2-Dibromo-3-chloropropane [96-12-8] ^	0.48	U	ug/L	1	0.48	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2-Dibromoethane [106-93-4] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2-Dichlorobenzene [95-50-1] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2-Dichloroethane [107-06-2] ^	0.46	U	ug/L	1	0.46	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,2-Dichloropropane [78-87-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,3,5-Trimethylbenzene [108-67-8] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,3-Dichlorobenzene [541-73-1] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,3-Dichloropropane [142-28-9] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
1,4-Dichlorobenzene [106-46-7] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
2,2-Dichloropropane [594-20-7] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
2-Butanone [78-93-3] ^	0.44	U	ug/L	1	0.44	5.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
2-Chloroethyl Vinyl Ether [110-75-8] ^	0.37	U	ug/L	1	0.37	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
2-Chlorotoluene [95-49-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
2-Hexanone [591-78-6] ^	0.60	U	ug/L	1	0.60	5.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
4-Chlorotoluene [106-43-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
4-Isopropyltoluene [99-87-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
4-Methyl-2-pentanone [108-10-1] ^	0.56	U	ug/L	1	0.56	5.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Acetone [67-64-1] ^	**2.1**	J	ug/L	1	0.62	5.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Benzene [71-43-2] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Bromobenzene [108-86-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Bromochloromethane [74-97-5] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Bromodichloromethane [75-27-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Bromoform [75-25-2] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Bromomethane [74-83-9] ^	0.49	U	ug/L	1	0.49	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Carbon disulfide [75-15-0] ^	0.40	U	ug/L	1	0.40	5.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Carbon tetrachloride [56-23-5] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Chlorobenzene [108-90-7] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Chloroethane [75-00-3] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Chloroform [67-66-3] ^	**4.1**		ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Chloromethane [74-87-3] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
cis-1,2-Dichloroethene [156-59-2] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
cis-1,3-Dichloropropene [10061-01-5] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Dibromochloromethane [124-48-1] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Dibromomethane [74-95-3] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Dichlorodifluoromethane [75-71-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Ethylbenzene [100-41-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Hexachlorobutadiene [87-68-3] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Isopropylbenzene [98-82-8] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Methylene chloride [75-09-2] ^	0.24	U	ug/L	1	0.24	2.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Methyl-tert-Butyl Ether [1634-04-4] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	

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Description:	MW-9	**Lab Sample ID:**	C807430-02	**Received:**	07/23/08 10:00
Matrix:	Ground Water	**Sampled:**	07/22/08 08:00	**Work Order:**	C807430
Project:	Owl's Den LF - Groundwater	**Sampled By:**	Tom Steelman		

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Naphthalene [91-20-3] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
n-Butyl Benzene [104-51-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
n-Propyl Benzene [103-65-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
sec-Butylbenzene [135-98-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Styrene [100-42-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
tert-Butylbenzene [98-06-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Tetrachloroethene [127-18-4] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Toluene [108-88-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
trans-1,2-Dichloroethene [156-60-5] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
trans-1,3-Dichloropropene [10061-02-6] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Trichloroethene [79-01-6] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Trichlorofluoromethane [75-69-4] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Vinyl chloride [75-01-4] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	
Xylenes (Total) [1330-20-7]	**0.88**	J	ug/L	1	0.40	1.0	8G28021	EPA 8260B	07/29/08 12:19	jkg	

Surrogates	*Results*	*DF*	*Spike Lvl*	*% Rec*	*% Rec Limits*	*Batch*	*Method*	*Analyzed*	*By*	Notes
4-Bromofluorobenzene	*55*	*1*	*50.0*	*110 %*	*69-120*	*8G28021*	*EPA 8260B*	*07/29/08 12:19*	*jkg*	
Dibromofluoromethane	*47*	*1*	*50.0*	*94 %*	*61-120*	*8G28021*	*EPA 8260B*	*07/29/08 12:19*	*jkg*	
Toluene-d8	*47*	*1*	*50.0*	*94 %*	*75-99*	*8G28021*	*EPA 8260B*	*07/29/08 12:19*	*jkg*	

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Description: MW-9
Matrix: Ground Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-02
Sampled: 07/22/08 08:00
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Metals by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Arsenic [7440-38-2] ^	2.8	U	ug/L	1	2.8	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Barium [7440-39-3] ^	**380**		ug/L	1	1.00	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Cadmium [7440-43-9] ^	0.36	U	ug/L	1	0.36	1.00	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Chromium [7440-47-3] ^	1.0	U	ug/L	1	1.0	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Lead [7439-92-1] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Mercury [7439-97-6] ^	0.11	U	ug/L	1	0.11	0.20	8G24003	EPA 7470A	07/25/08 14:40	MPL	
Selenium [7782-49-2] ^	2.7	U	ug/L	1	2.7	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	
Silver [7440-22-4] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:50	JDH	

This report relates only to the sample as received by the laboratory, and may only be reproduced in full.

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Description: MW-10
Matrix: Ground Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-03
Sampled: 07/22/08 08:30
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
1,1,1,2-Tetrachloroethane [630-20-6] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1,1-Trichloroethane [71-55-6] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1,2,2-Tetrachloroethane [79-34-5] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1,2-Trichloroethane [79-00-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1-Dichloroethane [75-34-3] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1-Dichloroethene [75-35-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,1-Dichloropropene [563-58-6] ^	0.32	U	ug/L	1	0.32	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2,3-Trichlorobenzene [87-61-6] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2,3-Trichloropropane [96-18-4] ^	0.47	U	ug/L	1	0.47	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2,4-Trichlorobenzene [120-82-1] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2,4-Trimethylbenzene [95-63-6] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2-Dibromo-3-chloropropane [96-12-8] ^	0.48	U	ug/L	1	0.48	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2-Dibromoethane [106-93-4] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2-Dichlorobenzene [95-50-1] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2-Dichloroethane [107-06-2] ^	0.46	U	ug/L	1	0.46	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,2-Dichloropropane [78-87-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,3,5-Trimethylbenzene [108-67-8] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,3-Dichlorobenzene [541-73-1] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,3-Dichloropropane [142-28-9] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
1,4-Dichlorobenzene [106-46-7] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
2,2-Dichloropropane [594-20-7] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
2-Butanone [78-93-3] ^	0.44	U	ug/L	1	0.44	5.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
2-Chloroethyl Vinyl Ether [110-75-8] ^	0.37	U	ug/L	1	0.37	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
2-Chlorotoluene [95-49-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
2-Hexanone [591-78-6] ^	0.60	U	ug/L	1	0.60	5.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
4-Chlorotoluene [106-43-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
4-Isopropyltoluene [99-87-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
4-Methyl-2-pentanone [108-10-1] ^	0.56	U	ug/L	1	0.56	5.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Acetone [67-64-1] ^	0.62	U	ug/L	1	0.62	5.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Benzene [71-43-2] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Bromobenzene [108-86-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Bromochloromethane [74-97-5] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Bromodichloromethane [75-27-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Bromoform [75-25-2] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Bromomethane [74-83-9] ^	0.49	U	ug/L	1	0.49	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Carbon disulfide [75-15-0] ^	0.40	U	ug/L	1	0.40	5.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Carbon tetrachloride [56-23-5] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Chlorobenzene [108-90-7] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Chloroethane [75-00-3] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Chloroform [67-66-3] ^	**2.5**		ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Chloromethane [74-87-3] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
cis-1,2-Dichloroethene [156-59-2] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
cis-1,3-Dichloropropene [10061-01-5] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Dibromochloromethane [124-48-1] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Dibromomethane [74-95-3] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Dichlorodifluoromethane [75-71-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Ethylbenzene [100-41-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Hexachlorobutadiene [87-68-3] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Isopropylbenzene [98-82-8] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Methylene chloride [75-09-2] ^	0.24	U	ug/L	1	0.24	2.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Methyl-tert-Butyl Ether [1634-04-4] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	

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Description:	MW-10	**Lab Sample ID:**	C807430-03	**Received:**	07/23/08 10:00
Matrix:	Ground Water	**Sampled:**	07/22/08 08:30	**Work Order:**	C807430
Project:	Owl's Den LF - Groundwater	**Sampled By:**	Tom Steelman		

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Naphthalene [91-20-3] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
n-Butyl Benzene [104-51-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
n-Propyl Benzene [103-65-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
sec-Butylbenzene [135-98-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Styrene [100-42-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
tert-Butylbenzene [98-06-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Tetrachloroethene [127-18-4] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Toluene [108-88-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
trans-1,2-Dichloroethene [156-60-5] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
trans-1,3-Dichloropropene [10061-02-6] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Trichloroethene [79-01-6] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Trichlorofluoromethane [75-69-4] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Vinyl chloride [75-01-4] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	
Xylenes (Total) [1330-20-7]	0.40	U	ug/L	1	0.40	1.0	8G28021	EPA 8260B	07/29/08 12:49	jkg	

Surrogates	*Results*	*DF*	*Spike Lvl*	*% Rec*	*% Rec Limits*	*Batch*	*Method*	*Analyzed*	*By*	Notes
4-Bromofluorobenzene	*53*	*1*	*50.0*	*106 %*	*69-120*	*8G28021*	*EPA 8260B*	*07/29/08 12:49*	*jkg*	
Dibromofluoromethane	*46*	*1*	*50.0*	*93 %*	*61-120*	*8G28021*	*EPA 8260B*	*07/29/08 12:49*	*jkg*	
Toluene-d8	*46*	*1*	*50.0*	*93 %*	*75-99*	*8G28021*	*EPA 8260B*	*07/29/08 12:49*	*jkg*	

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Description:	MW-10	**Lab Sample ID:**	C807430-03	**Received:**	07/23/08 10:00
Matrix:	Ground Water	**Sampled:**	07/22/08 08:30	**Work Order:**	C807430
Project:	Owl's Den LF - Groundwater	**Sampled By:**	Tom Steelman		

Metals by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Arsenic [7440-38-2] ^	2.8	U	ug/L	1	2.8	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Barium [7440-39-3] ^	**193**		ug/L	1	1.00	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Cadmium [7440-43-9] ^	0.36	U	ug/L	1	0.36	1.00	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Chromium [7440-47-3] ^	1.0	U	ug/L	1	1.0	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Lead [7439-92-1] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Mercury [7439-97-6] ^	0.11	U	ug/L	1	0.11	0.20	8G24003	EPA 7470A	07/25/08 14:43	MPL	
Selenium [7782-49-2] ^	2.7	U	ug/L	1	2.7	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	
Silver [7440-22-4] ^	1.9	U	ug/L	1	1.9	10.0	8G24001	EPA 6010B	07/26/08 12:57	JDH	

This report relates only to the sample as received by the laboratory, and may only be reproduced in full.

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Description: TRIP
Matrix: Water
Project: Owl's Den LF - Groundwater

Lab Sample ID: C807430-04
Sampled: 07/22/08 08:00
Sampled By: Tom Steelman

Received: 07/23/08 10:00
Work Order: C807430

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
1,1,1,2-Tetrachloroethane [630-20-6] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1,1-Trichloroethane [71-55-6] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1,2,2-Tetrachloroethane [79-34-5] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1,2-Trichloroethane [79-00-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1-Dichloroethane [75-34-3] ^	0.33	U	ug/L	1	0.33	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1-Dichloroethene [75-35-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,1-Dichloropropene [563-58-6] ^	0.32	U	ug/L	1	0.32	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2,3-Trichlorobenzene [87-61-6] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2,3-Trichloropropane [96-18-4] ^	0.47	U	ug/L	1	0.47	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2,4-Trichlorobenzene [120-82-1] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2,4-Trimethylbenzene [95-63-6] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2-Dibromo-3-chloropropane [96-12-8] ^	0.48	U	ug/L	1	0.48	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2-Dibromoethane [106-93-4] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2-Dichlorobenzene [95-50-1] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2-Dichloroethane [107-06-2] ^	0.46	U	ug/L	1	0.46	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,2-Dichloropropane [78-87-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,3,5-Trimethylbenzene [108-67-8] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,3-Dichlorobenzene [541-73-1] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,3-Dichloropropane [142-28-9] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
1,4-Dichlorobenzene [106-46-7] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
2,2-Dichloropropane [594-20-7] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
2-Butanone [78-93-3] ^	0.44	U	ug/L	1	0.44	5.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
2-Chloroethyl Vinyl Ether [110-75-8] ^	0.37	U	ug/L	1	0.37	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
2-Chlorotoluene [95-49-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
2-Hexanone [591-78-6] ^	0.60	U	ug/L	1	0.60	5.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
4-Chlorotoluene [106-43-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
4-Isopropyltoluene [99-87-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
4-Methyl-2-pentanone [108-10-1] ^	0.56	U	ug/L	1	0.56	5.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Acetone [67-64-1] ^	0.62	U	ug/L	1	0.62	5.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Benzene [71-43-2] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Bromobenzene [108-86-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Bromochloromethane [74-97-5] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Bromodichloromethane [75-27-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Bromoform [75-25-2] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Bromomethane [74-83-9] ^	0.49	U	ug/L	1	0.49	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Carbon disulfide [75-15-0] ^	0.40	U	ug/L	1	0.40	5.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Carbon tetrachloride [56-23-5] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Chlorobenzene [108-90-7] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Chloroethane [75-00-3] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Chloroform [67-66-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Chloromethane [74-87-3] ^	0.23	U	ug/L	1	0.23	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
cis-1,2-Dichloroethene [156-59-2] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
cis-1,3-Dichloropropene [10061-01-5] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Dibromochloromethane [124-48-1] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Dibromomethane [74-95-3] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Dichlorodifluoromethane [75-71-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Ethylbenzene [100-41-4] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Hexachlorobutadiene [87-68-3] ^	0.35	U	ug/L	1	0.35	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Isopropylbenzene [98-82-8] ^	0.24	U	ug/L	1	0.24	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Methylene chloride [75-09-2] ^	0.24	U	ug/L	1	0.24	2.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Methyl-tert-Butyl Ether [1634-04-4] ^	0.29	U	ug/L	1	0.29	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	

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Description:	TRIP	**Lab Sample ID:**	C807430-04	**Received:**	07/23/08 10:00
Matrix:	Water	**Sampled:**	07/22/08 08:00	**Work Order:**	C807430
Project:	Owl's Den LF - Groundwater	**Sampled By:**	Tom Steelman		

Volatile Organic Compounds by GCMS

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	MRL	Batch	Method	Analyzed	By	Notes
Naphthalene [91-20-3] ^	0.27	U	ug/L	1	0.27	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
n-Butyl Benzene [104-51-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
n-Propyl Benzene [103-65-1] ^	0.21	U	ug/L	1	0.21	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
sec-Butylbenzene [135-98-8] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Styrene [100-42-5] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
tert-Butylbenzene [98-06-6] ^	0.22	U	ug/L	1	0.22	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Tetrachloroethene [127-18-4] ^	0.36	U	ug/L	1	0.36	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Toluene [108-88-3] ^	0.20	U	ug/L	1	0.20	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
trans-1,2-Dichloroethene [156-60-5] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
trans-1,3-Dichloropropene [10061-02-6] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Trichloroethene [79-01-6] ^	0.25	U	ug/L	1	0.25	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Trichlorofluoromethane [75-69-4] ^	0.28	U	ug/L	1	0.28	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Vinyl chloride [75-01-4] ^	0.30	U	ug/L	1	0.30	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	
Xylenes (Total) [1330-20-7]	0.40	U	ug/L	1	0.40	1.0	8G28021	EPA 8260B	07/29/08 11:20	jkg	

Surrogates	*Results*	*DF*	*Spike Lvl*	*% Rec*	*% Rec Limits*	*Batch*	*Method*	*Analyzed*	*By*	Notes
4-Bromofluorobenzene	*54*	*1*	*50.0*	*108 %*	*69-120*	*8G28021*	*EPA 8260B*	*07/29/08 11:20*	*jkg*	
Dibromofluoromethane	*46*	*1*	*50.0*	*92 %*	*61-120*	*8G28021*	*EPA 8260B*	*07/29/08 11:20*	*jkg*	
Toluene-d8	*48*	*1*	*50.0*	*95 %*	*75-99*	*8G28021*	*EPA 8260B*	*07/29/08 11:20*	*jkg*	

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QUALITY CONTROL

Volatile Organic Compounds by GCMS - Quality Control

Batch 8G28021 - EPA 5030B_MS

Blank (8G28021-BLK1) Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 08:23

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Dichlorodifluoromethane	0.20	U	1.0	ug/L							
Chloromethane	0.23	U	1.0	ug/L							
Vinyl chloride	0.30	U	1.0	ug/L							
Bromomethane	0.49	U	1.0	ug/L							
Chloroethane	0.30	U	1.0	ug/L							
Trichlorofluoromethane	0.28	U	1.0	ug/L							
1,1-Dichloroethene	0.20	U	1.0	ug/L							
Acetone	0.62	U	5.0	ug/L							
Carbon disulfide	0.40	U	5.0	ug/L							
Methylene chloride	0.24	U	2.0	ug/L							
Methyl-tert-Butyl Ether	0.29	U	1.0	ug/L							
trans-1,2-Dichloroethene	0.25	U	1.0	ug/L							
1,1-Dichloroethane	0.33	U	1.0	ug/L							
2-Butanone	0.44	U	5.0	ug/L							
cis-1,2-Dichloroethene	0.30	U	1.0	ug/L							
2,2-Dichloropropane	0.24	U	1.0	ug/L							
Bromochloromethane	0.27	U	1.0	ug/L							
Chloroform	0.20	U	1.0	ug/L							
1,1,1-Trichloroethane	0.27	U	1.0	ug/L							
1,1-Dichloropropene	0.32	U	1.0	ug/L							
Carbon tetrachloride	0.35	U	1.0	ug/L							
1,2-Dichloroethane	0.46	U	1.0	ug/L							
Benzene	0.20	U	1.0	ug/L							
Trichloroethene	0.25	U	1.0	ug/L							
1,2-Dichloropropane	0.20	U	1.0	ug/L							
Dibromomethane	0.21	U	1.0	ug/L							
Bromodichloromethane	0.20	U	1.0	ug/L							
2-Chloroethyl Vinyl Ether	0.37	U	1.0	ug/L							
cis-1,3-Dichloropropene	0.24	U	1.0	ug/L							
4-Methyl-2-pentanone	0.56	U	5.0	ug/L							
Toluene	0.20	U	1.0	ug/L							
trans-1,3-Dichloropropene	0.30	U	1.0	ug/L							
1,1,2-Trichloroethane	0.20	U	1.0	ug/L							
1,3-Dichloropropane	0.28	U	1.0	ug/L							
Tetrachloroethene	0.36	U	1.0	ug/L							
2-Hexanone	0.60	U	5.0	ug/L							
Dibromochloromethane	0.28	U	1.0	ug/L							
1,2-Dibromoethane	0.27	U	1.0	ug/L							
Chlorobenzene	0.27	U	1.0	ug/L							
1,1,1,2-Tetrachloroethane	0.29	U	1.0	ug/L							
Ethylbenzene	0.20	U	1.0	ug/L							
Styrene	0.20	U	1.0	ug/L							
Bromoform	0.29	U	1.0	ug/L							
Isopropylbenzene	0.24	U	1.0	ug/L							
1,1,2,2-Tetrachloroethane	0.33	U	1.0	ug/L							
Bromobenzene	0.21	U	1.0	ug/L							
1,2,3-Trichloropropane	0.47	U	1.0	ug/L							
n-Propyl Benzene	0.21	U	1.0	ug/L							
2-Chlorotoluene	0.20	U	1.0	ug/L							

QUALITY CONTROL

Volatile Organic Compounds by GCMS - Quality Control

Batch 8G28021 - EPA 5030B_MS

Blank (8G28021-BLK1) Continued Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 08:23

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,3,5-Trimethylbenzene	0.25	U	1.0	ug/L							
4-Chlorotoluene	0.20	U	1.0	ug/L							
tert-Butylbenzene	0.22	U	1.0	ug/L							
1,2,4-Trimethylbenzene	0.20	U	1.0	ug/L							
sec-Butylbenzene	0.20	U	1.0	ug/L							
1,3-Dichlorobenzene	0.30	U	1.0	ug/L							
4-Isopropyltoluene	0.22	U	1.0	ug/L							
1,4-Dichlorobenzene	0.20	U	1.0	ug/L							
n-Butyl Benzene	0.20	U	1.0	ug/L							
1,2-Dichlorobenzene	0.27	U	1.0	ug/L							
1,2-Dibromo-3-chloropropane	0.48	U	1.0	ug/L							
1,2,4-Trichlorobenzene	0.36	U	1.0	ug/L							
Hexachlorobutadiene	0.35	U	1.0	ug/L							
Naphthalene	0.27	U	1.0	ug/L							
1,2,3-Trichlorobenzene	0.23	U	1.0	ug/L							
Xylenes (Total)	0.40	U	1.0	ug/L							
Surrogate: Dibromofluoromethane	*48*			*ug/L*	*50.0*		*97*	*61-120*			
Surrogate: Toluene-d8	*46*			*ug/L*	*50.0*		*93*	*75-99*			
Surrogate: 4-Bromofluorobenzene	*56*			*ug/L*	*50.0*		*112*	*69-120*			

LCS (8G28021-BS1) Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 08:52

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	22		1.0	ug/L	20.0		110	71-121			
Benzene	20		1.0	ug/L	20.0		102	77-128			
Trichloroethene	18		1.0	ug/L	20.0		91	79-120			
Toluene	18		1.0	ug/L	20.0		91	77-120			
Chlorobenzene	20		1.0	ug/L	20.0		102	78-120			

Matrix Spike (8G28021-MS1) Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 09:22

Source: C807496-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	22		1.0	ug/L	20.0	0.20 U	112	71-121			
Benzene	23		1.0	ug/L	20.0	0.20 U	114	77-128			
Trichloroethene	19		1.0	ug/L	20.0	0.25 U	97	79-120			
Toluene	19		1.0	ug/L	20.0	0.20 U	95	77-120			
Chlorobenzene	21		1.0	ug/L	20.0	0.27 U	107	78-120			

Matrix Spike Dup (8G28021-MSD1) Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 09:51

Source: C807496-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
1,1-Dichloroethene	24		1.0	ug/L	20.0	0.20 U	118	71-121	5	27	
Benzene	24		1.0	ug/L	20.0	0.20 U	122	77-128	6	27	
Trichloroethene	21		1.0	ug/L	20.0	0.25 U	106	79-120	9	27	
Toluene	21		1.0	ug/L	20.0	0.20 U	103	77-120	8	23	

QUALITY CONTROL

Volatile Organic Compounds by GCMS - Quality Control

Batch 8G28021 - EPA 5030B_MS

Matrix Spike Dup (8G28021-MSD1) Continued Prepared: 07/28/2008 10:27 Analyzed: 07/29/2008 09:51

Source: C807496-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chlorobenzene	23		1.0	ug/L	20.0	0.27 U	116	78-120	8	25	

Metals by EPA 6000/7000 Series Methods - Quality Control

Batch 8G24001 - EPA 3005A

Blank (8G24001-BLK1) Prepared: 07/24/2008 06:38 Analyzed: 07/26/2008 10:37

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	**3.8**	**J**	10.0	ug/L							
Barium	1.00	U	10.0	ug/L							
Cadmium	0.36	U	1.00	ug/L							
Chromium	1.0	U	10.0	ug/L							
Lead	1.9	U	10.0	ug/L							
Selenium	2.7	U	10.0	ug/L							
Silver	1.9	U	10.0	ug/L							

LCS (8G24001-BS1) Prepared: 07/24/2008 06:38 Analyzed: 07/26/2008 10:46

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	504	B	10.0	ug/L	500		101	82-117			
Barium	507		10.0	ug/L	500		101	72-125			
Cadmium	261		1.00	ug/L	250		104	72-120			
Chromium	497		10.0	ug/L	500		99	78-119			
Lead	494		10.0	ug/L	500		99	72-121			
Selenium	514		10.0	ug/L	500		103	82-127			
Silver	47.4		10.0	ug/L	50.0		95	80-128			

Matrix Spike (8G24001-MS1) Prepared: 07/24/2008 06:38 Analyzed: 07/26/2008 11:02

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	515	B	10.0	ug/L	500	2.8 U	103	64-126			
Barium	574		10.0	ug/L	500	71.3	101	74-119			
Cadmium	255		1.00	ug/L	250	0.36 U	102	68-121			
Chromium	489		10.0	ug/L	500	1.0 U	98	73-120			
Lead	481		10.0	ug/L	500	1.9 U	96	68-126			
Selenium	516		10.0	ug/L	500	2.7 U	103	65-129			
Silver	47.7		10.0	ug/L	50.0	1.9 U	95	69-121			

Matrix Spike Dup (8G24001-MSD1) Prepared: 07/24/2008 06:38 Analyzed: 07/26/2008 11:09

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	518	B	10.0	ug/L	500	2.8 U	104	64-126	0.6	12	
Barium	579		10.0	ug/L	500	71.3	101	74-119	0.8	11	
Cadmium	257		1.00	ug/L	250	0.36 U	103	68-121	0.6	12	

QUALITY CONTROL

Metals by EPA 6000/7000 Series Methods - Quality Control

Batch 8G24001 - EPA 3005A

Matrix Spike Dup (8G24001-MSD1) Continued Prepared: 07/24/2008 06:38 Analyzed: 07/26/2008 11:09

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Chromium	491		10.0	ug/L	500	1.0 U	98	73-120	0.4	10	
Lead	485		10.0	ug/L	500	1.9 U	97	68-126	0.8	19	
Selenium	526		10.0	ug/L	500	2.7 U	105	65-129	2	10	
Silver	48.2		10.0	ug/L	50.0	1.9 U	96	69-121	1	12	

Batch 8G24003 - EPA 7470A

Blank (8G24003-BLK1) Prepared: 07/24/2008 07:12 Analyzed: 07/25/2008 13:48

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Mercury	0.11	U	0.20	ug/L							

LCS (8G24003-BS1) Prepared: 07/24/2008 07:12 Analyzed: 07/25/2008 13:51

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Mercury	4.54		0.20	ug/L	5.00		91	87-123			

Matrix Spike (8G24003-MS1) Prepared: 07/24/2008 07:12 Analyzed: 07/25/2008 13:58

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Mercury	4.16		0.20	ug/L	5.00	0.11 U	83	63-132			

Matrix Spike Dup (8G24003-MSD1) Prepared: 07/24/2008 07:12 Analyzed: 07/25/2008 14:01

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Mercury	4.34		0.20	ug/L	5.00	0.11 U	87	63-132	4	10	

Post Spike (8G24003-PS1) Prepared: 07/24/2008 07:12 Analyzed: 07/25/2008 14:04

Source: C806768-01

Analyte	Result	Flag	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Mercury	4.40		0.20	ug/L	5.00	-0.03	89	0-200			

FLAGS/NOTES AND DEFINITIONS

B	The analyte was detected in the associated method blank.
D	The sample was analyzed at dilution.
J	The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
U	The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
MRL	Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.

ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

10775 Central Port Dr.
Orlando, FL 32824
(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 211
Jacksonville, FL 32216-6069
(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct.
Cary, NC 27511
(919) 467-3090 Fax (919) 467-3515

Page 1 of 1

Client Name: S&ME, Inc. (SM002)	Project Number: 1356-07-006
Address: 9751 Southern Pine Blvd.	Project Name/Desc: Owl's Den LF - Groundwater
City/ST/Zip: Charlotte, NC 28273	PO # / Billing Info: 47165
Tel: (704) 523-4726 Fax: (704) 525-3953	Reporting Contact: Courtney Withers
Sample(s) Name, Affiliation (Print): Tom Steelman	Billing Contact: Accounts Payable
Sample(s) Signature:	Facility # (if required):

Requested Analyses: 8260B; Ag,As,Ba,Cd,Cr,Hg,Pb,Se

Requested Turnaround Times
Note: Rush requests subject to acceptance by the facility
X Standard
___ Expedited
Due __/__/__

Lab Workorder: C807430

Preservation (See Codes) (Combine as necessary)

Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	H	N									Sample Comments
	MW-8	07/22/08	0815	G	GW	4	X	X									
	MW-9		0800	G	GW	4	X	X									
	MW-10		0830	G	GW	4	X	X									
	TRIP				WA	2	X										

<-- Total # of Containers

Sample Kit Prepared By: JWL	Date/Time: 7/7	Relinquished By: [signature]	Date/Time: 07/22/08 1330	Received By: Briana Gregory	Date/Time: 7/23/08 10:00
Comments:		Relinquished By:	Date/Time:	Received By:	Date/Time:
		Relinquished By:	Date/Time:	Received By:	Date/Time:
		Cooler #'s & Temps on Receipt: J-66 3.0°C		Condition Upon Receipt: ___ Acceptable ___ Unacceptable	

Matrix: GW-Groundwater SO-Soil SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)

Preservation: I-Ice H-HCl N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments)

Note: All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

APPENDIX IV

LABORATORY GRAIN-SIZE ANALYSIS AND POROSITY CALCULATION SHEETS

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

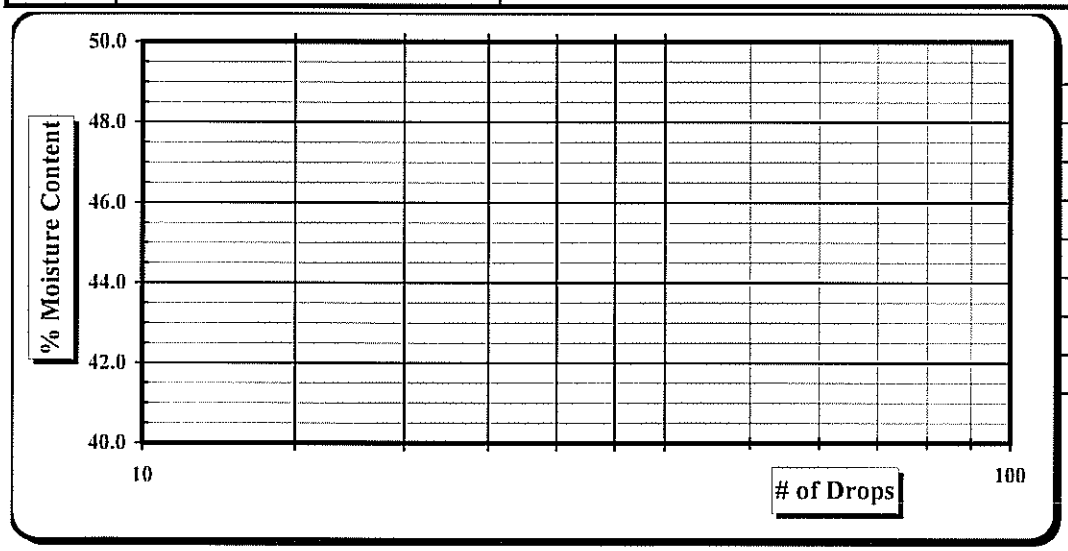
Project #:	**1356-08-002**	Report Date:	8/1/08
Project Name:	Owls Den Landfill Assessment	Test Date(s):	7/23/08-8/1/08
Client Name:	Lincoln County		
Client Address:			

Boring #: MW-8 Sample #: SS-10 Sample Date: 7/14/08

Location: Offset: Depth: 48.5-50'

Sample Description: Orange Black Brown Silty Fine to Medium Sand (SM)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #									
A	Tare Weight									
B	Wet Soil Weight + A									
C	Dry Soil Weight + A									
D	Water Weight (B-C)									
E	Dry Soil Weight (C-A)									
F	% Moisture Content (D/E)*100									
N	# OF DROPS							*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average									



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation	☐	Dry Preparation	☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method	☒	One-point Method	☐		Liquid Limit	
Classification:	ASTM D 2487	☒	AASHTO M 145	☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318	☒	AASHTO T 89	☐		Plastic Index	
Plastic limit Test:	ASTM D 4318	☒	AASHTO T 90	☐		Group Symbol	SM

Technician Name: Jennifer Olsen 117926 *Certification #*

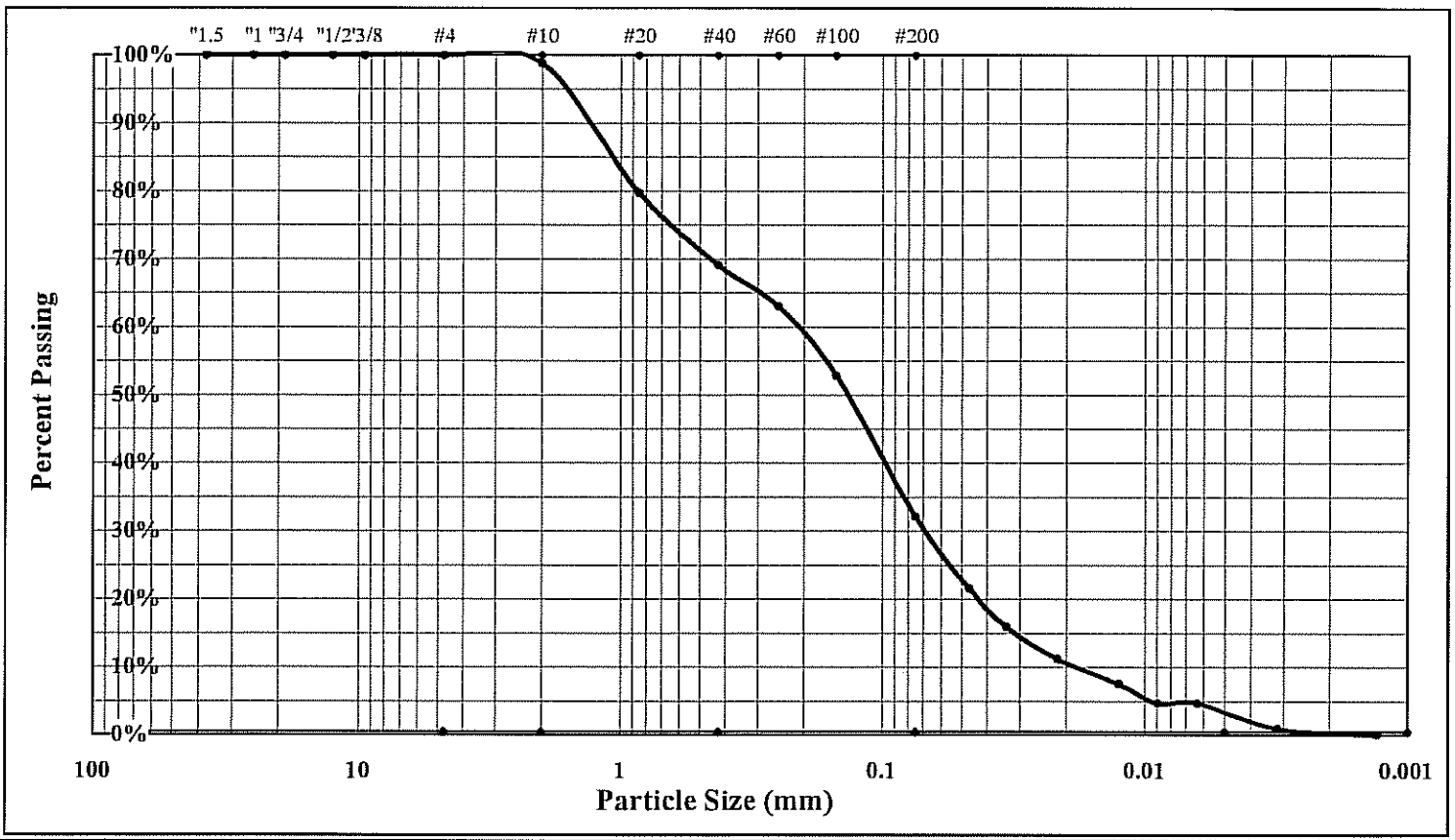
Technical Responsibility: Courtney Withers _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-08-002**	Report Date:	7/31/08
Project Name:	**Owl's Den Landfill Assessment**	Test Date(s):	7/23-31/08
Client Name:	Lincoln County		
Client Address:			

Boring #:	MW-8	Sample #:	SS-10	Sample Date:	7/14/08
Location:		Offset:		Depth:	48.5-50'
Sample Description:	Orange Black Brown Silty Fine to Medium Sand (SM)				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	0	Gravel	0.0%	Silt	29.1%
Silt & Clay (% Passing #200)	32.1%	Sand	67.9%	Clay	3.0%
Apparent Relative Density	2.950	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Courtney Withers

Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-08-002**
Project Name: Owl's Den Landfill Assessment
Client Name: Lincoln County
Client Address:

Test Date(s): 7/23-31/08
Report Date: 7/31/08

Boring #: MW-8 Sample #: SS-10 Sample Date: 7/14/08
Location: Offset: Depth: 48.5-50'
Sample Description: Orange Black Brown Silty Fine to Medium Sand (SM)

Pan #:	537	Beaker #:	RR		**Apparent Relative Density**		**2.950**	
Hydrometer Jar #:			A					
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			234.24		Tare #	9		
Weight of Total Sample Air Dried:			234.24	A	Tare Wt.	13.93		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.94		
Total Sample Oven Dried:			232.14	C	Dry Wt. + A	24.84		
Hydrometer Sample Oven Dried (W):			49.55	D	Water Wt. (B-C)	0.10		
% Passing #10:			98.8%	E	Dry Wt. (C-A)	10.91		
Correction Factor a (Table 1):			0.94		% Moisture (100 x D/E)	0.92%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		53	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	2.8	**100.0%**	98.8%
#20	9.6	80.6%	79.7%
#40	14.9	69.9%	69.1%
#60	18.0	63.8%	63.0%
#100	23.1	53.5%	52.8%
#200	33.4	32.5%	32.1%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	67.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	32.1%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	1.2%	< 4.75 mm and > 2.00 mm	Silt:	29.1%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	29.7%	< 2.00 mm and > 0.425 mm	Clay:	3.0%	< 0.005 mm		
Fine Sand:	36.9%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	17.0	5.5		11.50	21.8%	21.6%	14.4	0.01233	0.04679
	2	21.5	14.0	5.5		8.50	16.1%	15.9%	14.9	0.01233	0.03365
	5	21.5	11.5	5.5		6.00	11.4%	11.2%	15.3	0.01233	0.02157
	15	21.5	9.5	5.5		4.00	7.6%	7.5%	15.6	0.01233	0.01259
	30	21.5	8.0	5.5		2.50	4.7%	4.7%	15.9	0.01233	0.00897
	60	21.5	8.0	5.5		2.50	4.7%	4.7%	15.9	0.01233	0.00634
	250	21.5	6.0	5.5		0.50	0.9%	0.9%	16.2	0.01233	0.00314
	1440	22.0	5.0	5.0		0.00	0.0%	0.0%	16.3	0.01225	0.00130

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

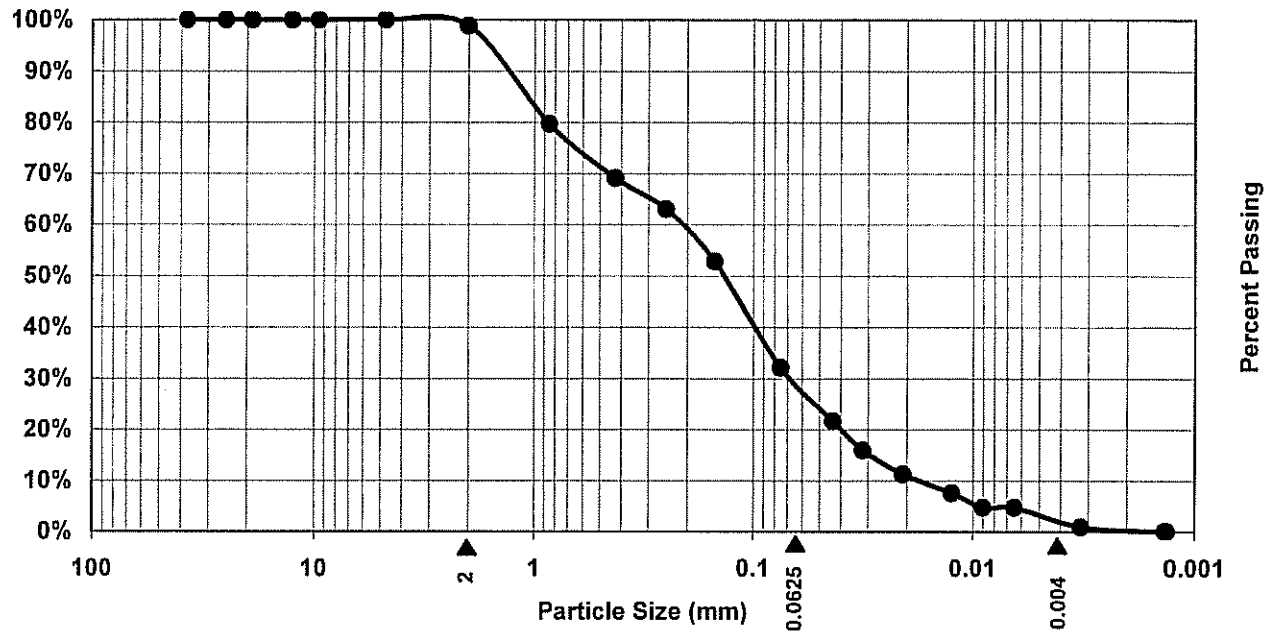
Technical Responsibility: Courtney Withers

Signature *Position*

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
MW-8	SS-10	48.5 to 50 ft bls

Sample Description:
Orange, Black, and Brown, Silty, Medium to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.2%	% Sand 70.0%	% Silt 27.0%	% Clay 1.8%
Adjusted for Calculations	**0%**	**71%**	**27%**	**2%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Lincoln County - Owls Den Landfill

S&ME Project No.:
1356-08-002

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Lincoln County - Owl's Den Landfill Site Assessment
S&ME PROJECT NO.: 1356-08-002

Boring No. MW-8

Boring Depth: 48.5 to 50 ft bls

% Sand: 71%

% Silt: 27%

% Clay: 2%

Estimated Specific Yield: 28%

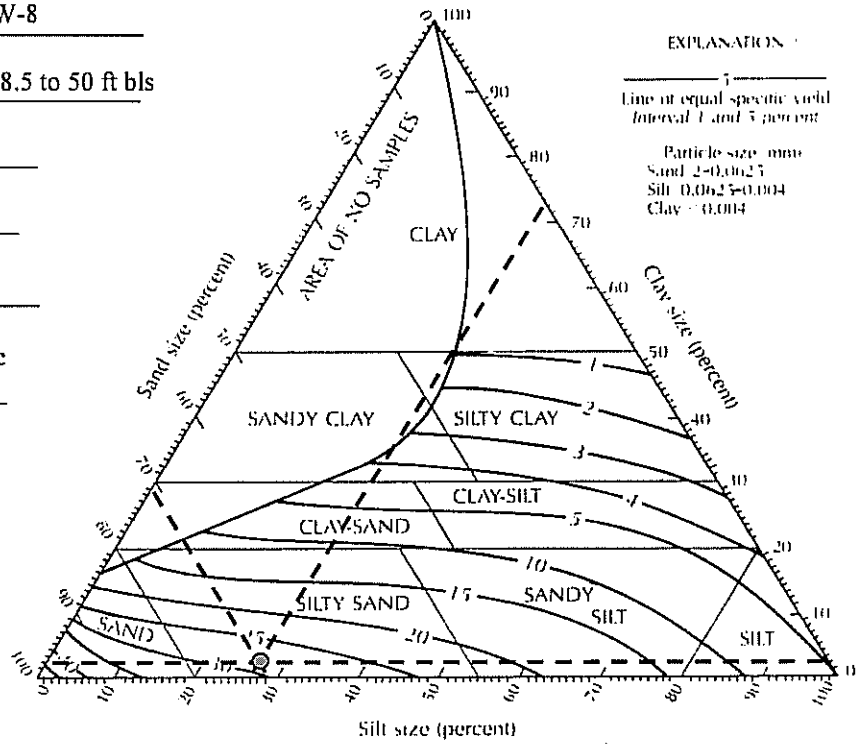
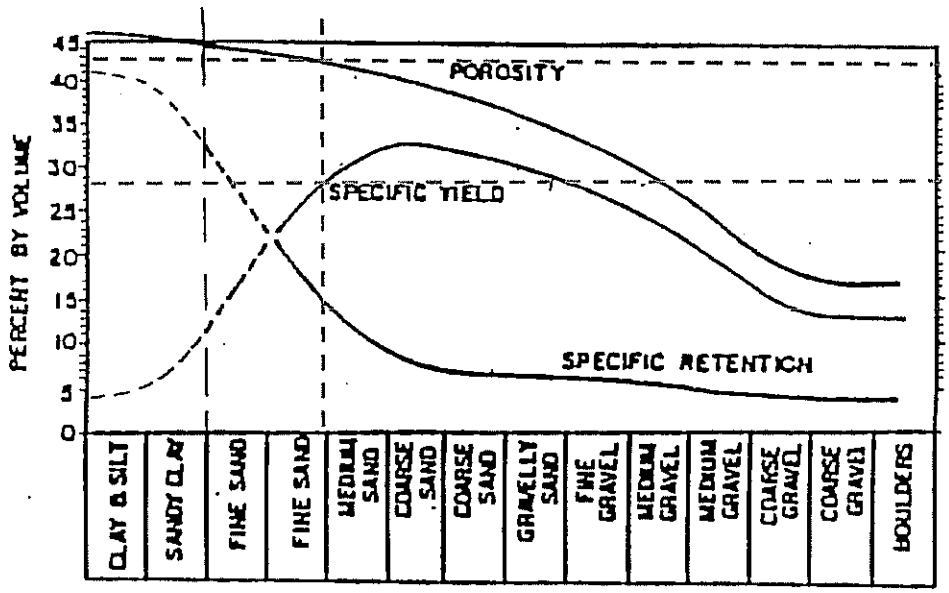


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 43%

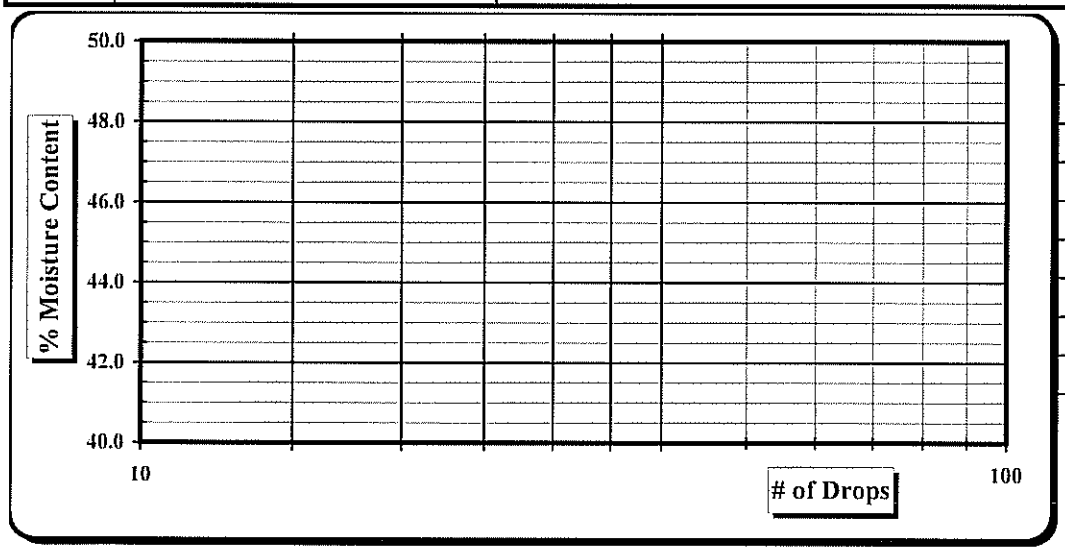
Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-08-002** Report Date: 8/1/08
Project Name: Owls Den Landfill Assessment Test Date(s): 7/23/08-8/1/08
Client Name: Lincoln County
Client Address:
Boring #: MW-9 Sample #: SS-10 Sample Date: 7/7/08
Location: Offset: Depth: 48.5-50'
Sample Description: Gray Tan Silty Fine to Medium Sand (SM) with Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	19						XY	9	
A	Tare Weight	15.81						**15.93**	13.93	
B	Wet Soil Weight + A	26.26						22.10	20.02	
C	Dry Soil Weight + A	23.61						20.58	18.53	
D	Water Weight (B-C)	2.65						1.52	1.49	
E	Dry Soil Weight (C-A)	7.80						4.65	4.60	
F	% Moisture Content (D/E)*100	34.0%						32.7%	32.4%	
N	# OF DROPS	22						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**33.5%**								
Ave.	Average	33.5%						32.5%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☐	One-point Method ☒		Liquid Limit	34
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	33
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	1
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	SM

Technician Name: Jennifer Olsen 117926 *Certification #*

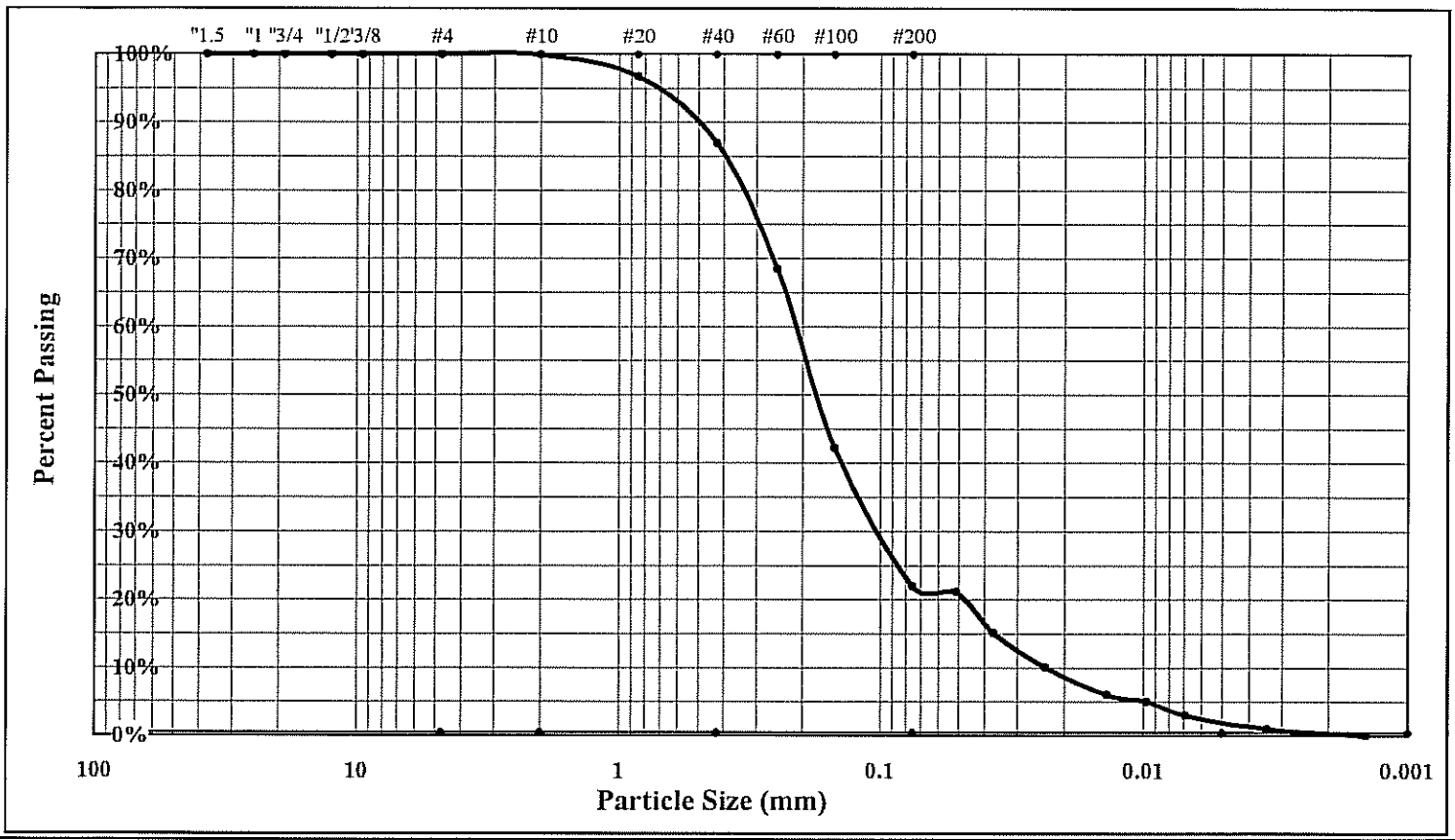
Technical Responsibility: Courtney Withers _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-08-002**	Report Date:	7/31/08
Project Name:	**Owl's Den Landfill Assessment**	Test Date(s):	7/23-31/08
Client Name:	Lincoln County		
Client Address:			

Boring #:	MW-9	Sample #:	SS-10	Sample Date:	7/7/08
Location:		Offset:		Depth:	48.5-50'
Sample Description:	Gray Tan Silty Fine to Medium Sand (SM) with Mica				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	0	Gravel	0.0%	Silt	19.9%
Silt & Clay (% Passing #200)	21.9%	Sand	78.1%	Clay	2.0%
Apparent Relative Density	2.650	Moisture Content		Colloids	
Liquid Limit	34	Plastic Limit	33	Plastic Index	1

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Courtney Withers _____ _____
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-08-002**
Project Name: Owl's Den Landfill Assessment
Client Name: Lincoln County
Client Address:

Test Date(s): 7/23-31/08
Report Date: 7/31/08

Boring #: MW-9 Sample #: SS-10 Sample Date: 7/7/08
Location: Offset: Depth: 48.5-50'
Sample Description: Gray Tan Silty Fine to Medium Sand (SM) with Mica

Pan #:	5311	Beaker #:	ZZ		**Apparent Relative Density**		**2.650**		
Hydrometer Jar #:			8						
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			189.20		Tare #	19			
Weight of Total Sample Air Dried:			189.20	A	Tare Wt.	15.81			
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.75			
Total Sample Oven Dried:			188.34	C	Dry Wt. + A	26.70			
Hydrometer Sample Oven Dried (W):			49.77	D	Water Wt. (B-C)	0.05			
% Passing #10:			99.9%	E	Dry Wt. (C-A)	10.89			
Correction Factor a (Table 1):			1.00		% Moisture (100 x D/E)	0.46%			

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		29	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.2	**100.0%**	99.9%
#20	1.6	96.8%	96.7%
#40	6.5	87.0%	86.9%
#60	15.7	68.5%	68.4%
#100	28.7	42.3%	42.2%
#200	38.8	22.0%	21.9%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	78.1%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	21.9%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.1%	< 4.75 mm and > 2.00 mm	Silt:	19.9%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	13.0%	< 2.00 mm and > 0.425 mm	Clay:	2.0%	< 0.005 mm		
Fine Sand:	65.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **34** Plastic Limit **33** Plastic Index **1** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	16.0	5.5		10.50	21.1%	21.1%	14.6	0.01340	0.05115
	2	21.5	13.0	5.5		7.50	15.1%	15.1%	15.1	0.01340	0.03678
	5	21.5	10.5	5.5		5.00	10.0%	10.0%	15.5	0.01340	0.02357
	15	21.5	8.5	5.5		3.00	6.0%	6.0%	15.8	0.01340	0.01375
	30	21.5	8.0	5.5		2.50	5.0%	5.0%	15.9	0.01340	0.00975
	60	21.5	7.0	5.5		1.50	3.0%	3.0%	16.0	0.01340	0.00693
	250	21.5	6.0	5.5		0.50	1.0%	1.0%	16.2	0.01340	0.00341
	1440	21.5	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01340	0.00143

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

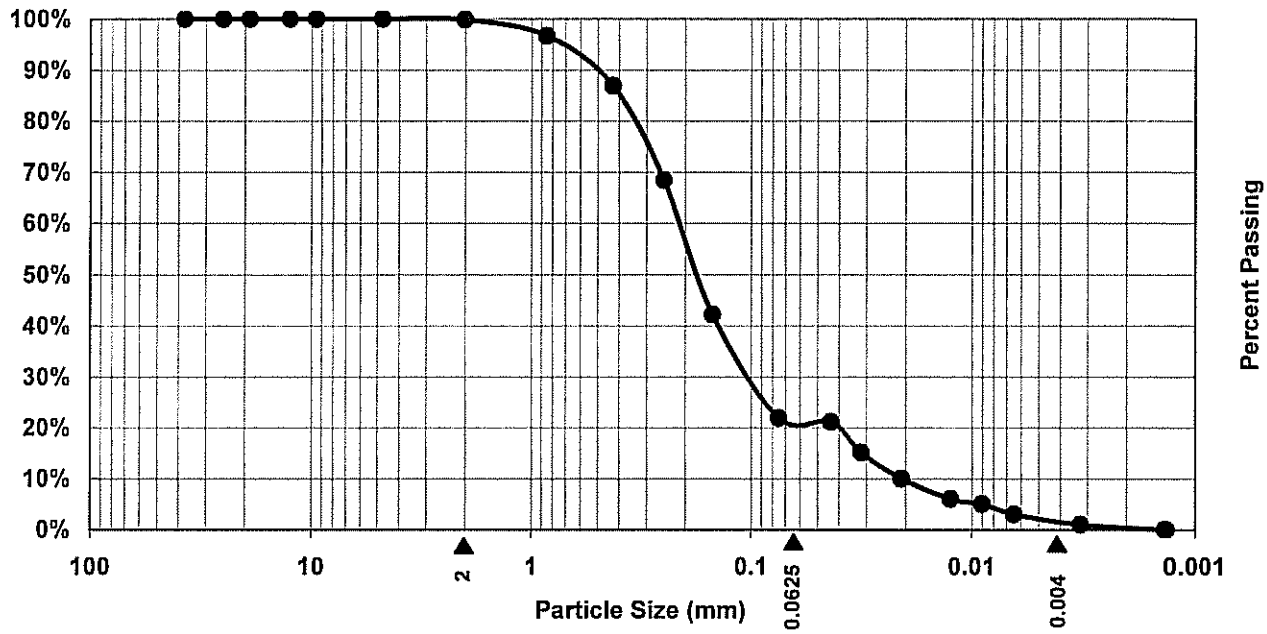
Technical Responsibility: Courtney Withers

Signature *Position*

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
MW-9	SS-10	48.5 to 50 ft bls

Sample Description:
Gray and Tan, Silty, Medium to Fine Sand with Mica (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.1%	% Sand 78.3%	% Silt 20.2%	% Clay 1.5%
Adjusted for Calculations	**0%**	**78%**	**20%**	**1%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Lincoln County - Owls Den Landfill

S&ME Project No.:
1356-08-002

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Lincoln County - Owl's Den Landfill Site Assessment
S&ME PROJECT NO.: 1356-08-002

Boring No. MW-9

Boring Depth: 48.5 to 50 ft bls

% Sand: 78%

% Silt: 20%

% Clay: 1%

Estimated Specific Yield: 31%

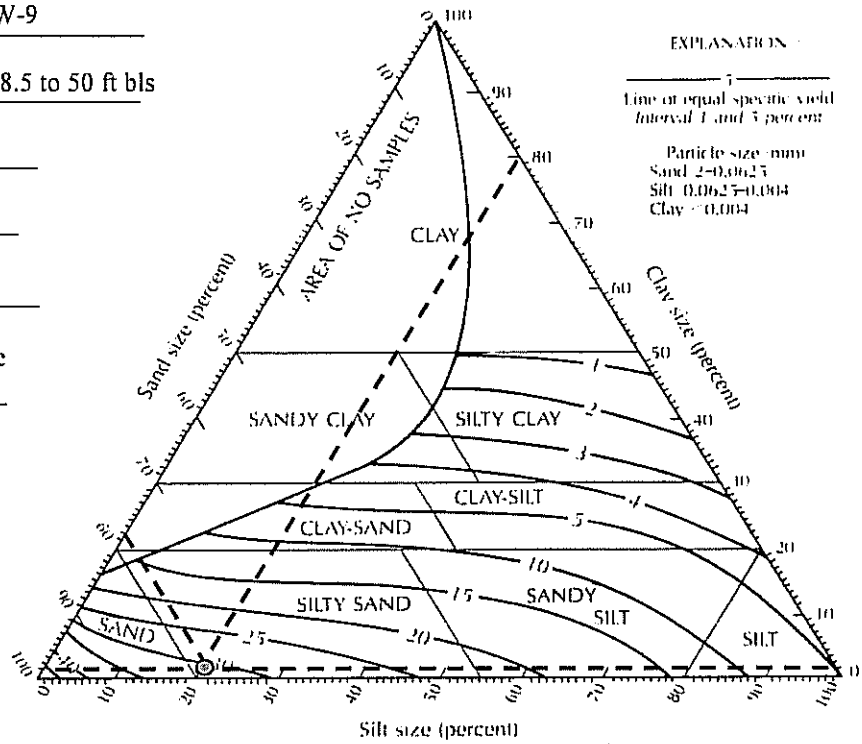
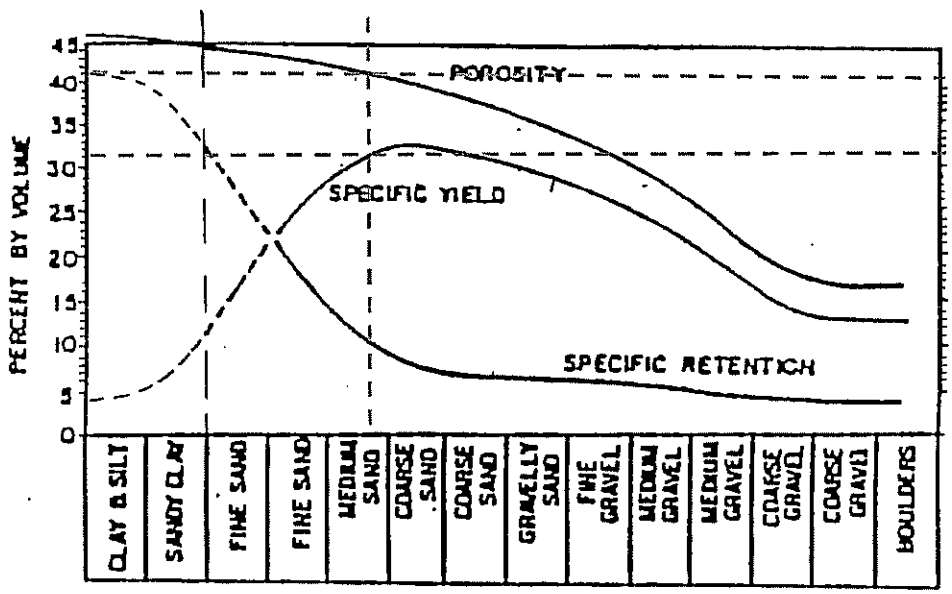


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 41%

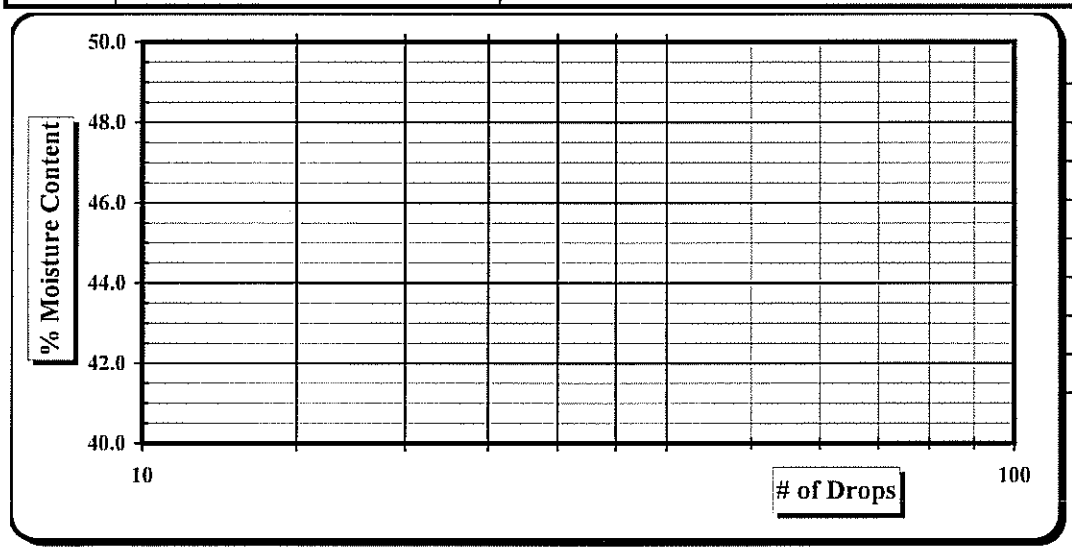
Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-08-002** Report Date: 8/1/08
Project Name: Owls Den Landfill Assessment Test Date(s): 7/23/08-8/1/08
Client Name: Lincoln County
Client Address:
Boring #: MW-10 Sample #: SS-8 Sample Date: 7/9/08
Location: Offset: Depth: 3/.5-40'
Sample Description: Black White Tan Silty Fine to Medium Sand (SM) with Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	36						LL		
A	Tare Weight	15.68						**16.96**		
B	Wet Soil Weight + A	27.02						23.08		
C	Dry Soil Weight + A	23.98						21.39		
D	Water Weight (B-C)	3.04						1.69		
E	Dry Soil Weight (C-A)	8.30						4.43		
F	% Moisture Content (D/E)*100	36.6%						38.1%		
N	# OF DROPS	24						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**36.4%**								
Ave.	Average	36.4%						38.1%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation	☐	Dry Preparation	☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method	☐	One-point Method	☒		Liquid Limit	36
Classification:	ASTM D 2487	☒	AASHTO M 145	☐		Plastic Limit	38
Liquid limit Test:	ASTM D 4318	☒	AASHTO T 89	☐		Plastic Index	-2
Plastic limit Test:	ASTM D 4318	☒	AASHTO T 90	☐		Group Symbol	SM

Technician Name: Jennifer Olsen 117926 *Certification #*

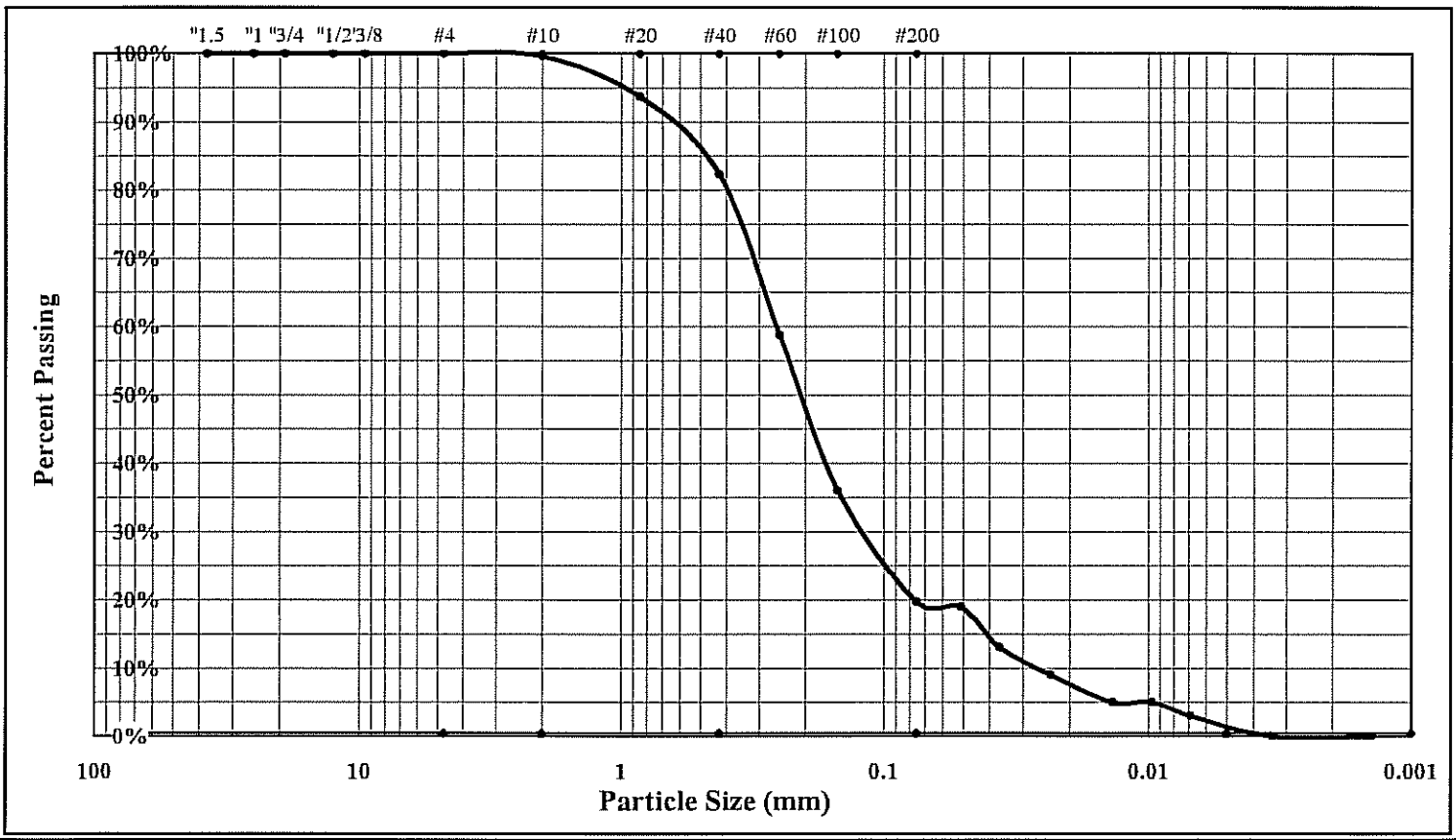
Technical Responsibility: Courtney Withers _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-08-002**	Report Date:	7/31/08
Project Name:	**Owl's Den Landfill Assessment**	Test Date(s):	7/23-31/08
Client Name:	Lincoln County		
Client Address:			

Boring #:	MW-10	Sample #:	SS-8	Sample Date:	7/9/08
Location:		Offset:		Depth:	38.5-40'
Sample Description:	Black White Tan Silty Fine to Medium Sand (SM) with Mica				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	0	Gravel	0.0%	Silt	18.7%
Silt & Clay (% Passing #200)	19.7%	Sand	80.3%	Clay	1.0%
Apparent Relative Density	2.670	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Courtney Withers

Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-08-002**
Project Name: Owl's Den Landfill Assessment
Client Name: Lincoln County
Client Address:

Test Date(s): 7/23-31/08
Report Date: 7/31/08

Boring #: MW-10 Sample #: SS-8 Sample Date: 7/9/08
Location: Offset: Depth: 38.5-40'
Sample Description: Black White Tan Silty Fine to Medium Sand (SM) with Mica

Pan #:	538	Beaker #:	PDQ		**Apparent Relative Density**		**2.670**
Hydrometer Jar #:			7				
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			213.96		Tare #	25	
Weight of Total Sample Air Dried:			213.96	A	Tare Wt.	14.36	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	25.55	
Total Sample Oven Dried:			213.01	C	Dry Wt. + A	25.50	
Hydrometer Sample Oven Dried (W):			49.78	D	Water Wt. (B-C)	0.05	
% Passing #10:			99.7%	E	Dry Wt. (C-A)	11.14	
Correction Factor a (Table 1):			1.00		% Moisture (100 x D/E)	0.45%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		OO	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.7	**100.0%**	99.7%
#20	3.0	94.0%	93.7%
#40	8.7	82.6%	82.3%
#60	20.4	59.0%	58.8%
#100	31.8	36.1%	36.0%
#200	39.9	19.8%	19.7%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	80.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	19.7%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	18.7%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	17.4%	< 2.00 mm and > 0.425 mm	Clay:	1.0%	< 0.005 mm		
Fine Sand:	62.6%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	15.0	5.5		9.50	19.1%	19.0%	14.7	0.01332	0.05113
	2	21.5	12.0	5.5		6.50	13.1%	13.0%	15.2	0.01332	0.03675
	5	21.5	10.0	5.5		4.50	9.0%	9.0%	15.6	0.01332	0.02349
	15	21.5	8.0	5.5		2.50	5.0%	5.0%	15.9	0.01332	0.01371
	30	21.5	8.0	5.5		2.50	5.0%	5.0%	15.9	0.01332	0.00969
	60	21.5	7.0	5.5		1.50	3.0%	3.0%	16.0	0.01332	0.00689
	250	21.5	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01332	0.00340
	1440	22.0	5.0	5.0		0.00	0.0%	0.0%	16.3	0.01324	0.00141

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

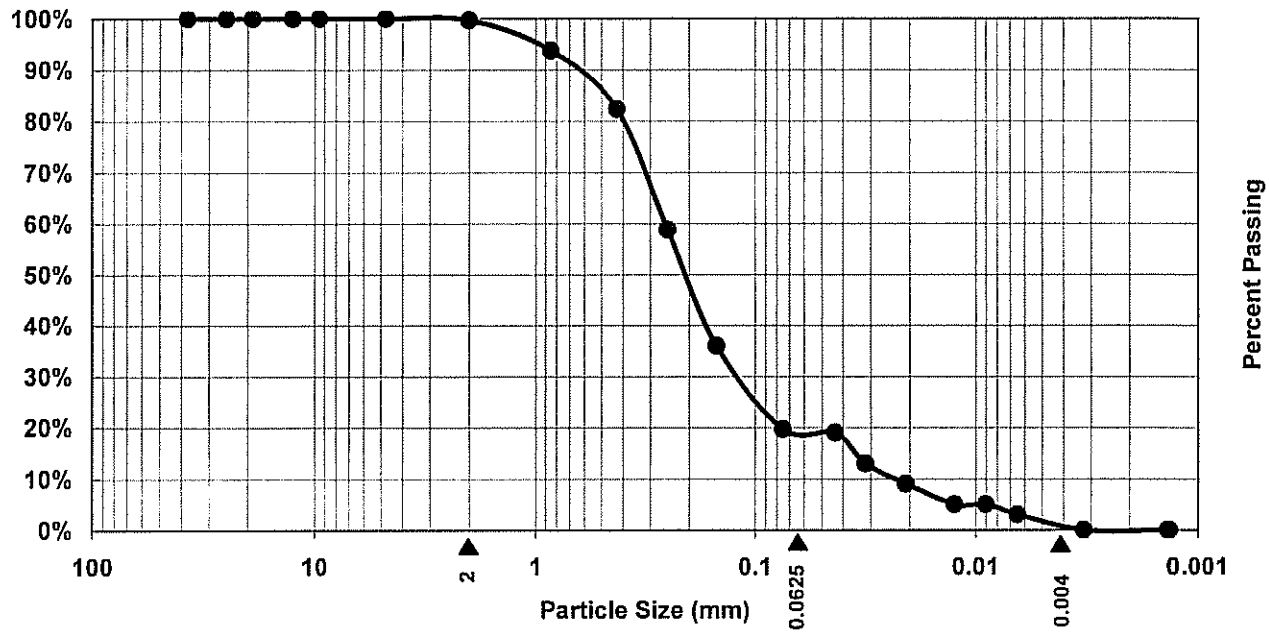
Technical Responsibility: Courtney Withers

Signature *Position*

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
MW-10	SS-8	38.5 to 40 ft bls

Sample Description:
Black, White, and Tan, Silty, Medium to Fine Sand with Mica (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.3%	% Sand 80.2%	% Silt 18.8%	% Clay 0.7%
Adjusted for Calculations	**0%**	**80%**	**19%**	**1%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Lincoln County - Owls Den Landfill

S&ME Project No.:
1356-08-002

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Lincoln County - Owl's Den Landfill Site Assessment
S&ME PROJECT NO.: 1356-08-002

Boring No. MW-10

Boring Depth: 38.5 to 40 ft bls

% Sand: 80%

% Silt: 19%

% Clay: 1%

Estimated Specific Yield: 31%

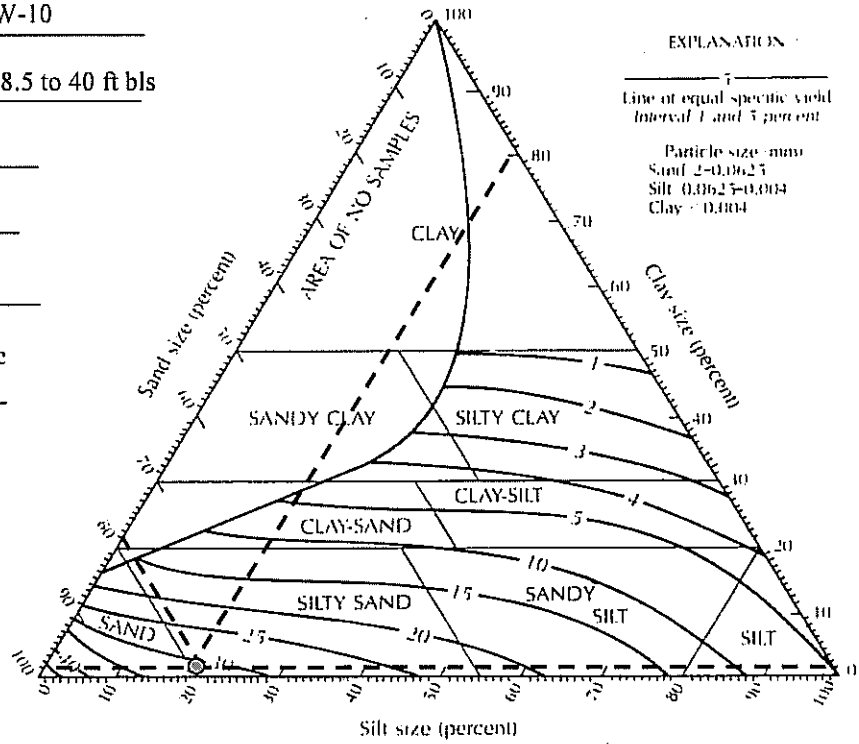
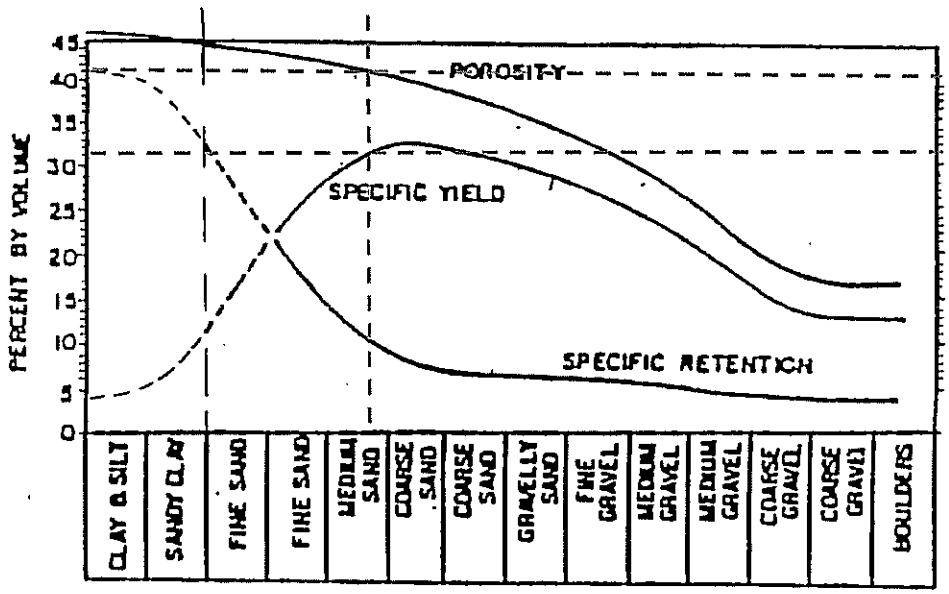


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 41%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)